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# ARMY MEDICAL DEPARTMENT

# REPORT

110275

## FOR THE YEAR 1870,

AND

## SUPPLEMENT TO REPORT FOR 1869.

VOLUME XII.

*Presented to both Houses of Parliament by Command of Her Majesty.*

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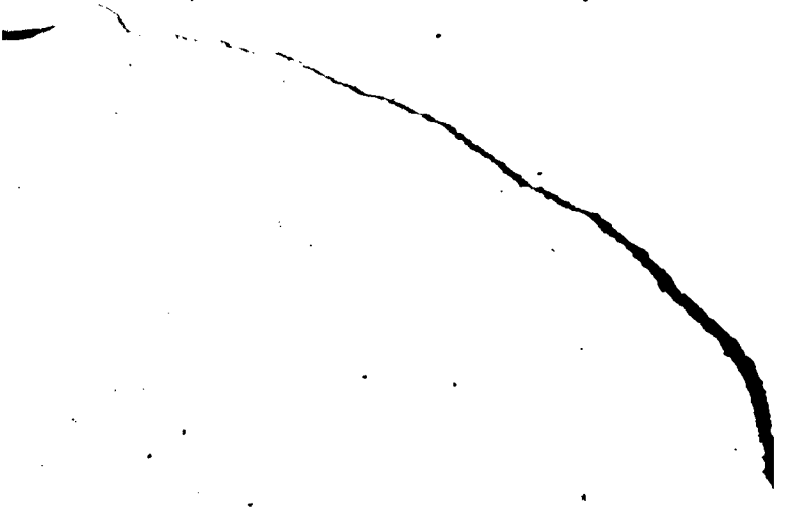

TO THE RIGHT HONOURABLE

THE SECRETARY OF STATE FOR WAR.

SIR,

IN accordance with instructions laid down for the conduct of business by the Director-General and Heads of Branches of the Army Medical Department, I have the honour to submit the accompanying Report on the Health of the Army in 1870, and on various matters connected with the duties of the Officers of the Department.

The Statistical Report has been drawn up by Deputy Inspector-General Balfour, F.R.S. The Sanitary and Medical Reports were prepared under the direction of Deputy Inspectors-General Massy, C.B., and Crawford, previously to their embarkation for India early in the year.

The delay which has occurred in the publication of the volume has arisen from the circumstance that the Returns from Bengal for 1869 did not reach this Department in time to be included in the volume for that year, and it was deemed advisable to publish the information contained in them as a Supplement to the present Report. This has accordingly been done, and arrangements have been made which, I trust, will prevent any similar delay in future.

I have the honour to be,
SIR,
Your most obedient
Humble Servant,
T. G. LOGAN,
*Director-General.*

ARMY MEDICAL DEPARTMENT,
*June* 1872.

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## ERRATA IN REPORT FOR 1869.

Page 44, First Table, first column, 4th line, *for* 17·21 *read* 17·72.
„ „ Second Table. *for* 1859-67 *read* 1859-68.
„ 145, Heading of first Table, *for* 1868 *read* 1869.
„ 192, Last ratio in Table, *for* 18·58 *read* 18·19.
„ 200, Last column of Table, China, *insert* 29·05.
„ 201, Table, Ceylon, *for* 21·0 *read* 51·0.
„ „ „ Australasia, *for* 54·41, *read* 34·41.
„ 590, „ column 5, *for* 315 *read* 215.
„ „ „ „ 723 „ 623.

# ARMY MEDICAL DEPARTMENT REPORT FOR 1870.

## I.—ON THE HEALTH OF THE TROOPS SERVING IN THE UNITED KINGDOM IN 1870.

### *Section* I.

### *Sickness and Mortality.*

#### STATISTICAL REPORT.

*United Kingdom.*

The weekly Returns of sick forwarded to the Army Medical Department for the 52 weeks ending 30th December, 1870, show an average strength of 75,305 non-commissioned officers and men, among whom there occurred 60,906 admissions into hospital and 697 deaths, and the average constantly non-effective from sickness was 2,905. These numbers give the proportion of 809 admissions, 9·26 deaths, and 38·58 constantly sick per 1,000 of mean strength. But, in addition to these, the Adjutant-General's Returns show an average strength of 6,730 men detached from their corps on various duties, furlough, &c., exclusive of invalids from foreign stations at Netley, and among these were 81 deaths during the year. The average strength, therefore, of the troops in the United Kingdom throughout the year was 82,035, and the deaths among them were 778, being in the ratio of 9·48 per 1,000.

The following Table shows the ratio of sickness per 1,000 of strength as stated in the weekly Returns, and of mortality per 1,000 of mean strength of the troops in 1870, as given in the Adjutant-General's Returns, compared with the average of the preceding ten years :—

| | Ratio per 1,000 of Mean Strength. | | |
|---|---|---|---|
| | Admitted into Hospital. | Died. | Constantly Sick. |
| 1870.. .. .. .. | 809 | 9·48 | 38·58 |
| 1860–69 .. .. .. | 941 | 9·51 | 47·82 |

The results do not differ materially from those of the preceding year, there being only a trifling increase in admissions and deaths and decrease in the mean daily sick.

The proportion of admissions and mean sick was considerably under, but that of the deaths corresponded very closely with the average of the preceding ten years.

The following Table shows the admissions and deaths by the different classes of diseases during the year, compared with the results of the preceding year :—

*United Kingdom.*

| Orders. | Average Strength in Weekly Returns, 75,305. Average Strength, including men detached, 82,035.* | Admitted into Hospital | Died. With the Regiment. | Died. Absent from the Regiment. | Died. Total. | Ratio per 1,000 of Mean Strength— 1870. Admitted. | 1870. Died. | 1869. Admitted. | 1869. Died. |
|---|---|---|---|---|---|---|---|---|---|
| | I. *General Diseases.* | | | | | | | | |
| 1 | Febrile Group .. | 4,902 | 43 | 3 | 46 | 65·1 | ·56 | 45·9 | ·49 |
| 2 | Constitutional ,, .. | 11,899 | 258 | 35 | 293 | 158·0 | 3·57 | 173·3 | 3·08 |
| | II. *Local Diseases.* | | | | | | | | |
| | Diseases of the— | | | | | | | | |
| 1 | Nervous System .. | 813 | 44 | 6 | 50 | 10·8 | ·61 | 11·5 | ·54 |
| 2 | Eye .. .. .. | 1,102 | .. | .. | .. | 14·7 | .. | 16·0 | .. |
| 3 | Ear .. .. .. | 250 | .. | .. | .. | 3·3 | .. | 3·7 | .. |
| 4 | Nose .. .. .. | 24 | .. | .. | .. | ·3 | .. | ·3 | .. |
| 5 | Circulatory System .. | 812 | 115 | 7 | 122 | 10·8 | 1·49 | 12·2 | 1·78 |
| 6 | Absorbent ,, .. | 996 | .. | .. | .. | 13·2 | .. | 12·1 | ·01 |
| 7 | Ductless Glands .. | 3 | .. | .. | .. | | .. | ·1 | ·03 |
| 8 | Respiratory System .. | 6,255 | 105 | 16 | 121 | 83·1 | 1·47 | 74·5 | 1·14 |
| 9 | Digestive ,, .. | 7,770 | 39 | 6 | 45 | 103·2 | ·55 | 87·4 | ·58 |
| 10 | Urinary ,, .. | 8,236 | 19 | 5 | 24 | 109·4 | ·29 | 122·3 | ·35 |
| 11 | Generative ,, .. | 947 | 1 | .. | 1 | 12·5 | ·01 | 13·1 | .. |
| 12 | Organs of Locomotion | 350 | 6 | .. | 6 | 4·6 | ·07 | 4·9 | ·05 |
| 13 | Cellular Tissue .. | 1,645 | 1 | .. | 1 | 21·8 | ·01 | 20·5 | ·04 |
| 14 | Cutaneous System .. | 7,183 | .. | .. | .. | 95·4 | .. | 96·9 | .. |
| | III. *Conditions, &c.* | | | | | | | | |
| | Debility .. .. | 267 | .. | .. | .. | 3·6 | .. | 3·6 | ·01 |
| | IV. *Poisons* .. | 201 | 4 | .. | 4 | 2·7 | ·05 | 3·1 | ·18 |
| | V. *Injuries.* | | | | | | | | |
| 2 | Accidental Injuries .. | 7,136 | 37 | 3 | 40 | 94·8 | ·49 | 94·1 | ·60 |
| 3 | Homicidal ,, .. | 2 | 3 | .. | 3 | ·3 | ·04 | ·1 | ·03 |
| 4 | Self-inflicted ,, .. | 19 | 22 | .. | 22 | | ·27 | | ·46 |
| 5 | Judicial ,, .. | .. | .. | .. | .. | .. | .. | ·2 | ·03 |
| | VI. *Surgical Operations* | 11 | .. | .. | .. | ·1 | .. | ·2 | ·01 |
| | No Appreciable Disease | 83 | .. | .. | .. | 1·1 | .. | 1·1 | .. |
| | Total .. .. | 60,906 | 697 | 81 | 778 | 808·8 | 9·48 | 797·1 | 9·41 |
| | Average, 10 years 1860–69 .. | .. | .. | .. | .. | 940·8 | 9·51 | .. | .. |

GENERAL DISEASES were very slightly more prevalent and fatal than in the preceding year; there was an increase of about 20 per 1,000 in the febrile group, but it was nearly counterbalanced by a decrease in the constitutional. There has been an increase in diseases of the respiratory and digestive systems and a decrease in those of the urinary system. The other classes have not differed materially from the preceding year.

* For obvious reasons the ratio of admissions into hospital has been calculated upon the first, and of deaths upon the second, of these numbers.

As the abolition of Depôt Battalions has involved to some extent a redistribution of the troops, it seems necessary, before proceeding to the examination of the sickness and mortality by groups of stations, to point out what changes have been made in these groups. Adhering to the same principle of classification as in previous Reports, the stations have been arranged as follows :—

1. *Seaport Towns.* — Devonport and Plymouth, Bristol, Portsmouth, Dover, Liverpool, Newcastle-on-Tyne, Cork.
2. *Dockyards and Arsenals.* — Chatham and Sheerness, Woolwich, Pembroke Dock.
3. *Camps.*—Aldershot, Shorncliffe, Colchester, the Curragh.
4. *Large Manufacturing Towns.*—Northampton, Birmingham, Sheffield. Ashton, Manchester, Bury, Preston, Burnley, Bradford, Glasgow, Paisley, Dundee, and Belfast.
5. *London and Windsor.*—Consisting only of the Household Cavalry and Foot Guards.
6. *Dublin.*
7. *Remaining Stations.*—Chiefly small towns not comprised in the preceding groups, or large towns where only a very small detachment of troops is quartered.

The admissions into hospital and deaths at each of these groups are shown in the following Tables :—

| | Average Strength. | Admitted into Hospital. | Died. | Average constantly Sick. |
|---|---|---|---|---|
| 1. Seaport Towns .. .. .. | 12,501 | 9,790 | 123 | 479 |
| 2. Dockyards and Arsenals .. .. | 11,084 | 9,990 | 97 | 461 |
| 3. Camps .. .. .. | 18,330 | 15,301 | 160 | 691 |
| 4. Large Manufacturing Towns .. | 4,406 | 3,596 | 36 | 166 |
| 5. London and Windsor .. .. | 5,364 | 3,598 | 49 | 218 |
| 6. Dublin .. .. .. | 4,495 | 3,610 | 58 | 204 |
| 7. Remaining Stations .. .. | 19,125 | 15,021 | 174 | 686 |
| 8. Detached from their Corps .. | 6,730 | .. | 81 | .. |
| Total .. | 82,035 | 60,906 | 778 | 2,905 |

| | Ratio per 1,000 of Strength. | | | | | |
|---|---|---|---|---|---|---|
| | 1870. | | | 1860–69. | | |
| | Admitted into Hospital. | Died. | Constantly Sick. | Admitted into Hospital. | Died. | Constantly Sick. |
| 1. Seaport Towns .. .. | 783 | 9·84 | 38·32 | 988 | 9.46 | 52·07 |
| 2. Dockyards and Arsenals .. | 901 | 8·75 | 41·59 | 1,082 | 9·68 | 52·13 |
| 3. Camps .. .. .. | 835 | 8·73 | 37·70 | 903 | 6·88 | 46·84 |
| 4. Large Manufacturing Towns | 816 | 8·17 | 37·68 | 1,022 | 9·44 | 48·30 |
| 5. London and Windsor | 671 | 9·13 | 40·64 | 847 | 7·61 | 49·44 |
| 6. Dublin .. .. .. | 803 | 12·90 | 45·38 | 938 | 9·58 | 52·62 |
| 7. Remaining Stations .. | 785 | 9·09 | 35·87 | 828 | 7·74 | 37·12 |
| 8. Men detached from their Corps .. .. .. | .. | 12·04 | .. | .. | .. | .. |
| Total .. .. | 809 | 9·48 | 38·40 | 941 | 9·51 | 47·82 |

*United Kingdom.*

The admissions into hospital, and the mean daily sick, have been under the average of the preceding ten years at all the groups of stations. The ratio of mortality has been above the average at the Camps, London and Windsor, Dublin, and also slightly at the Seaports. The high ratio of deaths among men detached from their corps is doubtless owing to that group including men on sick furlough. The difference in some of the groups may probably be to some extent due to the depôts, in which the rate of mortality has always been higher than in the corps, having, during the year, been attached to regiments at different stations instead of being concentrated in Depôt Battalions and forming a group by themselves.

Compared with the preceding year, there has been an increase in the admissions in the Dockyards and Arsenals, the Camps, and the Remaining Stations, and a decrease in all the other groups, most marked in Dublin. In the mortality there has been a decrease at the Dockyards and Arsenals and the large Manufacturing Towns, and an increase in all the other groups of stations. In all there has been a slight decrease in the proportion constantly non-effective from sickness.

The admissions and deaths by the various classes of diseases at the different groups of stations, are shown in the following Table :—

| Orders. | Groups of Stations ... | Seaports. | | Dockyards and Arsenals. | | Camps. | | Manufacturing Towns. | | London and Windsor. | | Dublin. | | Remaining Stations. | | Men detached from their Corps. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Strength ... | 12,501 | | 11,084 | | 18,330 | | 4,406 | | 5,364 | | 4,495 | | 19,125 | | 6,730 |
| | Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Died. |
| | I. *General Diseases.* | | | | | | | | | | | | | | | |
| 1 | Febrile Group... ... ... ... ... ... | 638 | 4 | 1,067 | 9 | 1,340 | 9 | 259 | 2 | 203 | 3 | 155 | 2 | 1,240 | 14 | 3 |
| 2 | Constitutional ,, ... ... ... ... ... | 1,679 | 42 | 1,507 | 38 | 2,719 | 52 | 794 | 16 | 1,173 | 20 | 1,047 | 30 | 2,980 | 60 | 35 |
| | II. *Local Diseases.* | | | | | | | | | | | | | | | |
| | Diseases of the— | | | | | | | | | | | | | | | |
| 1 | Nervous System ... ... ... ... ... ... | 117 | 6 | 137 | 1 | 204 | 13 | 40 | 3 | 33 | 5 | 58 | 3 | 224 | 13 | 6 |
| 2 | Eye ... ... ... ... ... ... ... ... | 202 | ... | 147 | ... | 246 | ... | 62 | ... | 34 | ... | 76 | ... | 335 | ... | ... |
| 3 | Ear ... ... ... ... ... ... ... ... | 36 | ... | 58 | ... | 46 | ... | 7 | ... | 9 | ... | 14 | ... | 80 | ... | ... |
| 4 | Nose... ... ... ... ... ... ... ... | 3 | ... | 5 | ... | 4 | ... | 3 | ... | ... | ... | 2 | ... | 7 | ... | ... |
| 5 | Circulatory System ... ... ... ... ... | 161 | 22 | 171 | 19 | 204 | 33 | 30 | 3 | 27 | 9 | 42 | 9 | 177 | 20 | 7 |
| 6 | Absorbent ... ... ... ... ... ... ... | 146 | ... | 116 | ... | 241 | ... | 60 | ... | 65 | ... | 76 | ... | 292 | ... | ... |
| 7 | Ductless Glands ... ... ... ... ... .. | 1 | ... | ... | ... | ... | ... | 1 | ... | 1 | ... | ... | ... | ... | ... | ... |
| 8 | Respiratory System ... ... ... ... ... | 1,153 | 26 | 1,268 | 16 | 1,423 | 22 | 299 | 4 | 342 | 3 | 368 | 5 | 1,402 | 29 | 16 |
| 9 | Digestive ,, ... ... ... ... ... | 1,228 | 8 | 1,417 | 4 | 2,100 | 10 | 367 | 5 | 531 | 1 | 380 | 2 | 1,747 | 9 | 6 |
| 10 | Urinary ,, ... ... ... ... ... | 1,544 | 2 | 1,229 | 4 | 1,835 | 5 | 581 | 2 | 407 | 2 | 516 | 2 | 2,074 | 2 | 5 |
| 11 | Generative ,, ... ... ... ... ... | 143 | ... | 163 | ... | 244 | ... | 59 | ... | 31 | ... | 56 | ... | 251 | 1 | ... |
| 12 | Organs of Locomotion ... ... ... ... ... | 68 | 2 | 71 | ... | 85 | 1 | 13 | ... | 22 | 2 | 31 | ... | 60 | 1 | ... |
| 13 | Cellular Tissue ... ... ... ... ... ... | 280 | ... | 264 | ... | 416 | ... | 105 | ... | 140 | ... | 111 | 1 | 329 | ... | ... |
| 14 | Cutaneous System ... ... ... ... ... | 1,102 | ... | 1,095 | ... | 2,122 | ... | 482 | ... | 259 | ... | 357 | ... | 1,766 | ... | ... |
| | III. *Conditions, &c.* | | | | | | | | | | | | | | | |
| | Debility ... ... ... ... ... ... ... | 50 | ... | 57 | ... | 72 | ... | 12 | ... | 13 | ... | 9 | ... | 54 | ... | ... |
| | IV. *Poisons* ... ... ... | 29 | ... | 29 | 1 | 52 | 1 | 10 | ... | 10 | 1 | 5 | ... | 66 | 1 | ... |
| | V. *Injuries.* | | | | | | | | | | | | | | | |
| 2 | Accidental ... ... ... ... ... ... ... | 1,187 | 9 | 1,169 | 2 | 1,869 | 8 | 462 | 1 | 292 | 2 | 302 | 1 | 1,915 | 14 | 3 |
| 3 | Homicidal ... ... ... ... ... ... ... | 1 | 1 | ... | ... | 1 | 2 | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 4 | Self-inflicted ... ... ... ... .. ... | 2 | 1 | 2 | 3 | 6 | 4 | ... | ... | 2 | 1 | 1 | 3 | 6 | 10 | ... |
| | VI. *Surgical Operations* ... ... | 3 | ... | 3 | ... | 1 | ... | ... | ... | 1 | ... | 2 | ... | 1 | ... | ... |
| | No Appreciable Disease ... ... ... ... ... | 17 | ... | 15 | ... | 21 | ... | 10 | ... | 3 | ... | 2 | ... | 15 | ... | ... |
| | Total ... ... ... ... ... ... | 9,790 | 123 | 9,990 | 97 | 15,301 | 160 | 3,596 | 36 | 3,598 | 49 | 3,610 | 58 | 15,021 | 174 | 81 |

Ratio per 1,000 of Mean Strength.

| Orders. | Groups and Stations / Diseases. | Seaports. | | Dockyards and Arsenals. | | Camps. | | Manufacturing Towns. | | London and Windsor. | | Dublin. | | Remaining Stations. | | Men detached from their Corps. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Died. |
| | I. *General Diseases.* | | | | | | | | | | | | | | | |
| 1 | Febrile Group | 51·0 | ·32 | 96·3 | ·81 | 73·1 | ·49 | 58·8 | ·45 | 37·8 | ·56 | 34·5 | ·45 | 64·8 | ·73 | ·45 |
| 2 | Constitutional „ | 134·3 | 3·36 | 136·0 | 3.43 | 148·3 | 2·84 | 180·2 | 3·63 | 218·7 | 3·73 | 232·9 | 6·67 | 155·8 | 3·14 | 5·20 |
| | II. *Local Diseases.* | | | | | | | | | | | | | | | |
| | Diseases of the— | | | | | | | | | | | | | | | |
| 1 | Nervous System | 9·4 | ·48 | 12·4 | ·09 | 11·1 | ·71 | 9·1 | ·68 | 6·1 | ·93 | 12·9 | ·66 | 11·7 | ·68 | ·89 |
| 2 | Eye | 16·2 | ... | 13·3 | ... | 13·4 | ... | 14·1 | ... | 6·3 | ... | 16·9 | ... | 17·5 | ... | ... |
| 3 | Ear | 2·9 | ... | 5·2 | ... | 2·5 | ... | 1·6 | ... | 1·7 | ... | 3·1 | ... | 4·2 | ... | ... |
| 4 | Nose | ·3 | ... | ·4 | ... | ·2 | ... | ·7 | ... | ... | ... | ·5 | ... | ·4 | ... | ... |
| 5 | Circulatory System | 12·9 | 1·76 | 15·4 | 1·72 | 11·1 | 1·80 | 6·8 | ·68 | 5·0 | 1·67 | 9·3 | 2·00 | 9·3 | 1·05 | 1·04 |
| 6 | Absorbent „ | 11·7 | ... | 10·5 | ... | 13·2 | ... | 13·6 | ... | 12·1 | ... | 16·9 | ... | 15·3 | ... | ... |
| 7 | Ductless Glands | ·1 | ... | ... | ... | ... | ... | ·2 | ... | ·2 | ... | ... | ... | ... | ... | ... |
| 8 | Respiratory System | 92·2 | 2·08 | 114·4 | 1.44 | 77·6 | 1·20 | 67·9 | ·91 | 63·8 | ·56 | 81·9 | 1·11 | 73·3 | 1·52 | 2·38 |
| 9 | Digestive „ | 98·2 | ·64 | 127·8 | ·36 | 114·6 | ·55 | 83·3 | 1·14 | 99·0 | ·19 | 84·5 | ·45 | 91·3 | ·47 | ·89 |
| 10 | Urinary „ | 123·5 | ·16 | 110·9 | ·36 | 102·9 | ·27 | 131·9 | ·45 | 75·9 | ·37 | 114·8 | ·45 | 108·5 | ·10 | ·74 |
| 11 | Generative „ | 11·4 | ... | 14·7 | ... | 13·3 | ... | 13·4 | ... | 5·8 | ... | 12·4 | ... | 13·1 | ·05 | ... |
| 12 | Organs of Locomotion | 5·4 | ·16 | 6·4 | ... | 4·6 | ·05 | 2·9 | ... | 4·1 | ·37 | 6·9 | ... | 3·1 | ·05 | ... |
| 13 | Cellular Tissue | 22·4 | ... | 23·8 | ... | 22·7 | ... | 23·8 | ... | 26·1 | ... | 24·7 | ·22 | 17·2 | ... | ... |
| 14 | Cutaneous System | 88·1 | ... | 98·8 | ... | 115·8 | ... | 109·4 | ... | 48·3 | ... | 79·4 | ... | 92·3 | ... | ... |
| | III. *Conditions, &c.* | | | | | | | | | | | | | | | |
| | Debility | 4·0 | ... | 5·1 | ... | 3·9 | ... | 2·7 | ... | 2·4 | ... | 2·0 | ... | 2·8 | ... | ... |
| | IV. *Poisons* | 2·3 | ... | 2·6 | ·09 | 2·8 | ·05 | 2·3 | ... | 1·9 | ·19 | 1·1 | ... | 3·5 | ·05 | ... |
| | V. *Injuries.* | | | | | | | | | | | | | | | |
| 2 | Accidental | 94·9 | ·72 | 105·5 | ·18 | 102·0 | ·44 | 91·2 | ·23 | 54·4 | ·37 | 67·2 | ·22 | 100·1 | ·73 | ·45 |
| 3 | Homicidal | ·1 | ·08 | ... | ... | ·1 | ·11 | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 4 | Self-inflicted | ·2 | ·08 | ·2 | ·27 | ·3 | ·22 | ... | ... | ·4 | ·19 | ·2 | ·67 | ·3 | ·52 | ... |
| | VI. *Surgical Operations* | ·2 | ... | ·3 | ... | ·1 | ... | ... | ... | ·2 | ... | ·5 | ... | ·1 | ... | ... |
| | No Appreciable Disease | 1·4 | ... | 1·3 | ... | 1·2 | ... | 2·3 | ... | ·6 | ... | ·5 | ... | ·8 | ... | .. |
| | Total | 783·1 | 9·84 | 901·3 | 8·75 | 834·8 | 8·73 | 816·2 | 8·17 | 670·8 | 9·13 | 803·1 | 12·90 | 785·4 | 9·09 | 12·04 |

GENERAL DISEASES.—As in the preceding year, the febrile group was most prevalent in the Dockyards and Arsenals, and the constitutional in Dublin. The ratio of admissions and deaths by the principal diseases of this class per 1,000 of mean strength during the year was as follows:— *United Kingdom*

| General Diseases. | | Annual Ratio per 1,000 of Mean Strength. | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Seaport Towns. | Dockyards and Arsenals. | Camps. | Large Manufacturing Towns. | London and Windsor. | Dublin. | Remaining Stations. |
| *Febrile.* | | | | | | | | |
| Eruptive Fevers .. | Admitted .. | 2·6 | 9·4 | 6·8 | 2·7 | 4·8 | 4·0 | 3·7 |
| | Died .. .. | ·08 | ·09 | ·10 | .. | ·19 | .. | .20 |
| Continued Fevers .. | Admitted .. | 21·3 | 24·2 | 26·0 | 26·8 | 21·4 | 19·4 | 20·7 |
| | Died .. .. | ·16 | ·54 | ·27 | ·45 | ·37 | ·22 | ·31 |
| Paroxysmal Fevers .. | Admitted .. | 16·4 | 28·2 | 23·6 | 7·0 | .. | 6·5 | 30·1 |
| | Died .. .. | .. | .. | .. | .. | .. | .. | ·11 |
| Influenza .. | Admitted .. | 6·6 | 27·2 | 11·8 | 18·4 | 9·5 | 1·8 | 6·8 |
| | Died .. .. | .. | .. | .. | .. | .. | .. | .. |
| Erysipelas.. | Admitted .. | 2·9 | 3·7 | 2·2 | ·9 | 1·7 | 1·5 | 2·6 |
| | Died .. .. | .. | .09 | .. | .. | .. | ·22 | ·11 |
| Other Febrile Affections .. | Admitted .. | 1·2 | 3·6 | 2·7 | 3·0 | ·4 | 1·3 | ·9 |
| | Died .. .. | ·08 | ·09 | ·12 | .. | .. | .. | .. |
| *Constitutional.* | | | | | | | | |
| Rheumatism | Admitted .. | 44·4 | 55·9 | 45·0 | 37·7 | 33·4 | 38·7 | 40·6 |
| | Died .. .. | ·16 | ·36 | .16 | .. | .. | ·22 | ·16 |
| Syphilis .. | Admitted .. | 70·8 | 61·4 | 89·4 | 124·6 | 166·5 | 176·6 | 99·1 |
| | Died .. .. | .. | .. | ·16 | .. | ·37 | ·22 | ·11 |
| Scrofula, Phthisis,&c. | Admitted .. | 15·0 | 16·4 | 11·8 | 12·3 | 14·9 | 15·8 | 14·2 |
| | Died .. .. | 2·88 | 2·98 | 2·46 | 3·40 | 2·98 | 6·23 | 2·72 |
| Scurvy and Purpura .. | Admitted .. | .. | ·4 | ·3 | ·2 | ·2 | .. | ·3 |
| | Died .. .. | .. | .. | .. | .. | .. | .. | .. |
| Anæmia .. | Admitted .. | 3·1 | 1·0 | ·8 | 2·7 | 2·0 | ·7 | ·6 |
| | Died .. .. | .. | .. | .. | .. | .. | .. | .. |
| Other Constitutional Affections . | Admitted .. | 1·0 | ·9 | 1·0 | 2·7 | 1·7 | 1·1 | 1·0 |
| | Died .. .. | ·32 | ·09 | ·06 | ·23 | ·37 | .. | ·15 |

*Eruptive Fevers* were considerably more prevalent than in 1869 at the Dockyards and Arsenals and in the Camps. At the former the excess was due to prevalence of measles and scarlet fever at Woolwich and measles at Chatham; in the Camps it was caused by measles and scarlet fever at Aldershot, and scarlet fever at Colchester.

*Continued Fevers* were more prevalent than in the preceding year at all the groups of stations, except the Seaport Towns, where there was a marked decrease. The excess, however, was to no great extent, except at the Dockyards and Arsenals, where the proportion in 1869 had been very low, and was nearly doubled during the year under review. The increase was principally in cases of simple continued fever and febricula, except at Pembroke Dock, where an outbreak of enteric fever occurred, extending from the 15th January to the 11th March, and giving rise during that period to 15 admissions and four deaths among the soldiers. The full details of this epidemic, by Deputy Inspector-

*United Kingdom.*

General Massy, C.B., Head of the Sanitary Branch, will be found at page 352 of the 11th volume of these Reports. At none of the other stations did this disease prevail as an epidemic. Only one case of cerebro-spinal fever was reported during the year; it occurred at Portsmouth, and terminated in recovery.

*Paroxysmal Fevers* were in excess of the proportion in 1869 at all the groups except London and Windsor, where no cases were admitted. They were most prevalent in the group of Remaining Stations, the Dockyards and Arsenals, and the Camps. But this was not due to any local cause, but to the circumstance of a number of corps recently returned from India being quartered at some of the stations in these groups. The effect of this was particularly well marked at Aberdeen and Stirling, Woolwich and Chatham, Shorncliffe and Colchester, and to a less extent at Aldershot.

*Influenza* was considerably above the average in the Dockyards and Arsenals from its prevalence at Woolwich during the first quarter of the year, and in the large Manufacturing Towns, from its prevalence at Preston during the last quarter. None of the cases proved fatal.

*Erisypelas* did not prevail to any extent at any of the stations. Chatham, Devonport, and Dover furnished the highest proportion of admissions.

*Rheumatism* shows a decrease in the admissions at the Seaport Towns, Dockyards and Arsenals, and in Dublin; at the other groups of stations they do not differ materially from the preceding year.

*Syphilis* shows a marked decrease in all the groups, except London and Windsor, where there was a trifling increase, and the Remaining Stations, where the ratio in the two years was identical. Dublin, London and Windsor, and the large Manufacturing Towns, still continue to furnish a much higher proportion of cases than the other groups. As in 1869, the groups most exempt were the Dockyards and Arsenals, Seaport Towns, and the Camps.

The following Table shows the prevalence of primary venereal sores at all the stations in the United Kingdom at which the number of troops amounted to 500 men and upwards:—

*United Kingdom.*

| Stations. | Admissions into Hospital per 1,000 of Mean Strength for Primary Venereal Sores in | | | |
|---|---|---|---|---|
| | 1867. | 1868. | 1869. | 1870. |
| Devonport and Plymouth .. .. | 76 | 66 | 74 | 58 |
| Portsmouth .. .. .. .. | 116 | 86 | 62 | 51 |
| Chatham and Sheerness .. .. | 71 | 63 | 41 | 47 |
| Woolwich .. .. .. .. | 88 | 46 | 52 | 43 |
| Aldershot .. .. .. .. | 81 | 77 | 63 | 67 |
| Windsor .. .. .. .. | 58 | 136 | 93 | 67 |
| Shorncliffe .. .. .. .. | 42 | 77 | 60 | 100 |
| Colchester .. .. .. .. | 145 | 182 | 85 | 42 |
| Winchester .. .. .. .. | 52 | 104 | 101 | 61 |
| Dover .. .. .. .. | 132 | 111 | 80 | 30 |
| Canterbury .. .. .. .. | 119 | 114 | 45 | 152 |
| Maidstone .. .. .. .. | 242 | 122 | 128 | 68 |
| Cork .. .. .. .. .. | 72 | 61 | 73 | 68 |
| Curragh .. .. .. .. | 104 | 85 | 88 | 56 |
| *Isle of Wight* .. .. .. | 59 | 103 | 129 | 64 |
| *London* .. .. .. .. | 163 | 148 | 144 | 160 |
| *Warley* .. .. .. .. | 74 | 92 | 61 | 55 |
| Hounslow .. .. .. .. | 62 | 106 | 85 | 88 |
| Pembroke Dock .. .. .. | 28 | 35 | 51 | 54 |
| Sheffield .. .. .. .. | 163 | 107 | 146 | 77 |
| Manchester .. .. .. .. | 177 | 115 | 160 | 92 |
| Preston .. .. .. .. | 87 | 87 | 172 | 134 |
| Edinburgh .. .. .. .. | 63 | 46 | 60 | 99 |
| Fermoy .. .. .. .. | 70 | 47 | 116 | 89 |
| Limerick .. .. .. .. | 117 | 114 | 54 | 136 |
| Athlone .. .. .. .. | 35 | 38 | 42 | 44 |
| Dublin .. .. .. .. | 129 | 139 | 180 | 128 |
| Belfast .. .. .. .. | 89 | 56 | 52 | 43 |

At the 14 stations above the line, in this Table, the Contagious Diseases Act was in operation during the whole or very nearly the whole year, and at 10 of them there has been a decrease in the admissions by primary sores. At Shorncliffe there was a considerable, and at Chatham and Aldershot a trifling, increase. At Canterbury the Act came into operation on the 21st January, and the admissions during the year were greatly in excess of the three preceding years. At the other stations where the Act was not in operation there was an increase, compared with the amount in 1869, at six, and a decrease at eight. The increase was most marked at Limerick, but London was the station at which the highest proportion of admissions occurred. Comparing the 14 stations at which the Act was in operation with the 14 to which it had not been extended, the admissions per 1,000 of mean strength for primary venereal sores were 54·5 at the former, and 113·3 at the latter.

*Scrofula, Phthisis, &c.*—There was an increase in the ratio of admissions by these diseases at the Seaport Towns, amounting nearly to 3 per 1,000, and in the deaths at Dublin to the extent of 3·67 per 1,000, but these were probably merely accidental variations due to the small numbers under observation. At the other groups the results did not differ materially from those of the preceding year.

Local Diseases.—*Diseases of the Circulatory System* were rather less prevalent than in 1869 at all the groups except London and Windsor, where there was a trifling increase in the admissions, and where the exceptionally low ratio of deaths of that year, which was noted as probably an accidental irregularity, was not maintained, the deaths having been slightly above the

*United Kingdom.*

average. Of the fatal cases 55 were diseases of the heart and 67 disease of arteries. Those of the *Respiratory System* were considerably above the average at the Dockyards and Arsenals, chiefly from the prevalence of bronchitis at Woolwich and Chatham during the first quarter of the year. The ratio was also high at the Seaport Towns from bronchitis in the first quarter at Portsmouth, and in the last quarter at Devonport.

*Diseases of the Digestive System.*—As in the preceding year the ratio of admissions by these diseases has been considerably above the average at the Dockyards and Arsenals, chiefly from tonsillitis and dyspepsia at Woolwich and Chatham, and diarrhœa at Woolwich.

*Diseases of the Urinary System* were the most prevalent of the classes of Local Diseases, and were considerably in excess at the large Manufacturing Towns and the Seaports. At the former the high ratio was mainly due to gonorrhœa at Manchester, Preston, Sheffield, and Belfast, and at the latter to its prevalence at Devonport and Portsmouth.

*Diseases of the Cutaneous System* were in excess at the Camps, the most prevalent affection being ulcers, boils, and itch; and at the large Manufacturing Towns from the same diseases, particularly at Bury, Preston, and Manchester.

Poisons.—The admissions under this head were all from *delirium tremens*, except five returned as alcoholic poisoning, two as poisoning by oxalic acid, and one by lead. There were four deaths, three by *delirium tremens* and one by alcoholic poisoning; in the latter case the man died in a cab while being conveyed to hospital.

Injuries.—The admissions differed little from the preceding year, except that there was a decrease in the ratio at London and Windsor and in Dublin. Of the deaths in this class, 40 were accidental, 3 homicidal, and 22 suicidal. The means by which suicide was committed were—in 10 by gunshot, 5 by cut-throat, 2 by multiple injury by rail (the men having thrown themselves in front of trains), 2 by poison (cyanide of potassium), 1 by hanging, 1 by drowning, and 1 by concussion of the brain caused by jumping out of a window.

The admissions, deaths, and invaliding in the different arms of the service are shown in the following Table, those corps only being included, however, which were serving in the United Kingdom during the whole of the period embraced in this Report:—

| | Average Strength. | Admitted into Hospital. | Died in and out of Hospital. | Discharged as Invalids. | Annual Ratio per 1,000 of Strength. | | | 1860-69. Annual Ratio per 1,000. | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. |
| Household Cavalry | 1,208 | 715 | 12 | 21 | 592 | 9·94 | 17·38 | 610 | 7·72 | 16·02 |
| Dragoon Guards & Dragoons .. | 7,965 | 5,735 | 68 | 292 | 720 | 8·53 | 36·66 | 862 | 6·54 | 29·38 |
| Royal Artillery .. | 9,674 | 7,668 | 83 | 375 | 793 | 8·57 | 38·76 | 931 | 8·07 | * .. |
| Royal Engineers.. | 2,983 | .. | 24 | 39 | .. | 8·04 | 13·07 | .. | 6·61 | .. |
| Foot Guards .. | 5,674 | 3,557 | 52 | 131 | 627 | 9·16 | 23·08 | 801 | 7·94 | 27·61 |
| Infantry Regts. .. | 33,823 | 23,919 | 267 | 1,061 | 707 | 7·89 | 31·27 | 806 | 7·90 | 28·64 |
| Army Hosp. Corps | 694 | .. | 17 | 16 | .. | 24·49 | 23·05 | .. | .. | .. |
| Army Service „ | 1,655 | 995 | 17 | 37 | 601 | 10·26 | 22·35 | .. | .. | .. |
| Depôt Brig., R.A.. | 1,770 | 1,820 | 19 | 49 | 1,028 | 10·73 | 27·68 | 1,093 | 10·03 | *26·58 |
| Coast Brig., R.A.. | 1,555 | .. | 29 | 7 | .. | 18·64 | 4·50 | .. | 17·54 | 9·04 |
| Depôts .. .. | 8,362 | 7,790 | 95 | 344 | 932 | 11·36 | 41·14 | 965 | 11·57 | 39·89 |

* Prior to 1864 it was found impossible to separate the Invalids of the Brigades serving at Home from those of the Depôt Brigades. The ratio discharged as Invalids in 1870, calculated in the same manner as for the preceding years, would be 37·04 in 1,000 of the strength.

Compared with the preceding years this Table shows an increase in the admissions in the Household Cavalry and in the Depôts, and a decrease in the Cavalry of the Line, the Foot Guards and Infantry Regiments; while in the Royal Artillery and Depôt Brigade the results in the two years were identical. The ratio of deaths has been lower than in 1869 in Royal Artillery, and Depôts, but higher in all the other branches of the Service. The Army Hospital Corps continues to show a very high rate of mortality. *United Kingdom.*

With a view to correct any irregularity in these results arising from men being invalided in an advanced stage of disease, a Return has been obtained from the War Office showing the number of men from the different corps included in the preceding Table, placed on the pension list during the year, and the number of those who died between the date of their discharge and the 31st December. On adding to the strength of the troops, one-half of the numbers pensioned, on the principle explained in previous Reports, and to the mortality, the deaths which occurred on the pension list to 31st December, the following results are obtained:—

| | 1870. | | | 1860–69. |
|---|---|---|---|---|
| | Average Strength corrected as above. | Deaths of Soldiers and Pensioners. | Ratio of Deaths per 1,000 of Strength. | Ratio of Deaths of Soldiers and Pensioners per 1,000 of Strength. |
| Household Cavalry .. .. .. | 1,230 | 14 | 11·38 | 9·67 |
| Cavalry of the Line .. .. .. | 8,178 | 80 | 9·78 | 7·60 |
| Royal Artillery .. .. .. | 9,969 | 98 | 9·83 | 8·95 |
| Foot Guards .. .. .. .. | 5,752 | 66 | 11·47 | 10·39 |
| Infantry Regiments .. .. .. | 34,507 | 326 | 9·45 | 9·20 |

Compared with the results for the preceding year this Table shows a decrease in the mortality, thus corrected, in the Household Cavalry and Royal Artillery, and an increase in the other arms; the highest ratio being still furnished by the Foot Guards and Household Cavalry. In all the arms however the mortality has been slightly above the average of the preceding ten years, calculated on the same principle.

The influence of the different classes of diseases in causing sickness and mortality in each arm of the Service, is shown in the following Table; the details are given in Abstract No. 1, in the Appendix.

| Orders. | | Household Cavalry. | | | Cavalry. | | | Royal Artillery. | | | Foot Guards. | | | Infantry Regiments. | | | Depôt Brigade Royal Artillery. | | | Depôts. | | | Royal Engineers. | Coast Brigade, R. A. | | Army Hospital Corps. | | Army Service Corps. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Strength .. .. .. | 1,208 | | | 7,965 | | | 9,674 | | | 5,674 | | | 33,823 | | | 1,770 | | | 8,362 | | | 2,983 | 1,555 | | 694 | | 1,655 | | |
| | Diseases. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Died. | Died. | Invalided. | Died. | Invalided. | Admitted. | Died. | Invalided. |
| | I. *General Diseases.*, | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Febrile Group .. | 24 | .. | .. | 201 | 3 | .. | 548 | 2 | 7 | 212 | 4 | .. | 1,695 | 15 | .. | 270 | 1 | .. | 652 | 11 | .. | 1 | 1 | .. | 1 | .. | 102 | 1 | .. |
| 2 | Constitutional „ .. | 129 | 9 | 9 | 1,243 | 15 | 93 | 1,288 | 30 | 106 | 1,189 | 16 | 75 | 5,007 | 111 | 356 | 242 | 10 | 13 | 1,304 | 35 | 107 | 7 | 11 | 5 | 6 | 7 | 68 | 6 | 13 |
| | II. *Local Diseases.* Diseases of the— | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Nervous System .. | 11 | 1 | 4 | 76 | 4 | 24 | 110 | 4 | 30 | 35 | 6 | 8 | 302 | 19 | 111 | 24 | 2 | 5 | 126 | 2 | 24 | 2 | 4 | .. | 1 | 3 | 17 | .. | 3 |
| 2 | Eye .. .. .. | 11 | .. | 2 | 65 | .. | 5 | 111 | .. | 20 | 36 | .. | 1 | 536 | .. | 53 | 15 | .. | .. | 141 | .. | 18 | .. | .. | .. | .. | .. | 16 | .. | 1 |
| 3 | Ear .. .. .. | 2 | .. | 1 | 13 | .. | 5 | 38 | .. | 2 | 8 | .. | 1 | 110 | .. | 12 | 13 | .. | .. | 17 | .. | 5 | .. | .. | .. | .. | .. | 3 | .. | .. |
| 4 | Nose .. .. .. | .. | .. | .. | 1 | .. | .. | 1 | .. | .. | .. | .. | .. | 7 | .. | .. | 2 | .. | .. | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 5 | Circulatory System .. | 5 | 1 | 2 | 62 | 11 | 33 | 137 | 22 | 71 | 27 | 11 | 11 | 316 | 30 | 166 | 21 | 3 | 13 | 142 | 15 | 64 | 2 | 10 | .. | 1 | 2 | 12 | 3 | 6 |
| 6 | Absorbent „ .. | 20 | .. | .. | 101 | .. | .. | 118 | .. | 1 | 68 | .. | .. | 352 | .. | 2 | 12 | .. | .. | 153 | .. | 1 | .. | .. | .. | .. | .. | 13 | .. | .. |
| 7 | Ductless Glands .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 8 | Respiratory System .. | 79 | .. | .. | 509 | 13 | 31 | 847 | 10 | 15 | 331 | 6 | 6 | 2,285 | 42 | 79 | 176 | 2 | 1 | 856 | 19 | 32 | 6 | 1 | .. | 4 | 1 | 78 | 3 | 3 |
| 9 | Digestive „ .. | 147 | .. | .. | 589 | 7 | 29 | 998 | 7 | 44 | 486 | 2 | 5 | 2,920 | 13 | 114 | 305 | 1 | 7 | 1,095 | 7 | 29 | .. | 1 | 1 | .. | .. | 128 | .. | 10 |
| 10 | Urinary „ .. | 58 | 1 | 1 | 631 | 2 | 11 | 1,052 | 3 | 13 | 444 | 1 | 4 | 3,579 | 4 | 14 | 238 | .. | 1 | 1,119 | 3 | 7 | 3 | 1 | .. | 2 | 1 | 129 | 1 | .. |
| 11 | Generative „ .. | 7 | .. | 1 | 113 | .. | 5 | 164 | .. | 1 | 32 | .. | 3 | 339 | .. | 13 | 18 | .. | 2 | 112 | 1 | 4 | .. | .. | .. | .. | 1 | 23 | .. | .. |
| 12 | Organs of Locomotion.. | 3 | .. | .. | 46 | .. | 13 | 40 | 1 | 15 | 28 | 2 | 4 | 126 | .. | 34 | 16 | .. | 2 | 36 | 1 | 9 | .. | .. | .. | 1 | .. | 3 | 1 | 1 |
| 13 | Cellular Tissue .. .. | 27 | .. | .. | 178 | .. | 2 | 189 | .. | 1 | 139 | .. | 3 | 673 | 1 | 4 | 25 | .. | 1 | 199 | 1 | 1 | .. | .. | .. | .. | .. | 22 | .. | .. |
| 14 | Cutaneous System .. | 81 | .. | .. | 875 | .. | 10 | 891 | .. | 10 | 235 | .. | 1 | 2,797 | .. | 10 | 213 | .. | .. | 978 | .. | 12 | .. | .. | 1 | .. | 1 | 121 | .. | .. |
| | III. *Conditions, &c.* Debility .. .. .. | 4 | .. | .. | 10 | .. | 9 | 25 | .. | 20 | 9 | .. | 2 | 104 | .. | 63 | 3 | .. | .. | 77 | .. | 19 | .. | .. | .. | .. | .. | .. | .. | .. |
| | IV. *Poisons* .. | 4 | .. | .. | 16 | .. | .. | 17 | .. | .. | 7 | 1 | .. | 98 | .. | .. | 8 | .. | .. | 13 | .. | .. | .. | .. | .. | .. | .. | 5 | 1 | .. |
| | V. *Injuries.* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Accidental .. .. | 103 | .. | 1 | 860 | 6 | 20 | 1,079 | 2 | 16 | 263 | 3 | 5 | 2,634 | 20 | 27 | 217 | .. | 4 | 746 | .. | 10 | 3 | .. | .. | 1 | .. | 155 | 1 | .. |
| 3 | Homicidal .. .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 4 | Self-inflicted .. .. | .. | .. | .. | 2 | 6 | .. | 1 | 2 | 1 | 2 | .. | 1 | 5 | 10 | 1 | .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| | VI. *Surg. Operations* .. | .. | .. | .. | 2 | .. | 1 | 1 | .. | 2 | 1 | .. | 1 | 3 | .. | 2 | .. | .. | .. | 2 | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| | No Appreciable Disease .. | .. | .. | .. | 2 | .. | .. | 13 | .. | .. | 5 | .. | .. | 29 | .. | .. | 2 | .. | .. | 16 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| | Total .. .. | 715 | 12 | 21 | 5,735 | 68 | 292 | 7,668 | 83 | 375 | 3,557 | 52 | 131 | 23,919 | 267 | 1061 | 1,820 | 19 | 49 | 7,790 | 95 | 344 | 24 | 29 | 7 | 17 | 16 | 995 | 17 | 37 |

## Ratio per 1,000 of Mean Strength.

| Order. | Diseases. | Household Cavalry. | | | Cavalry. | | | Royal Artillery. | | | Foot Guards. | | | Infantry Regiments. | | | Depôt Brigade Royal Artillery. | | | Depôts. | | | Royal Engineers. | Coast Brigade, R.A. | | Army Hospital Corps. | | Army Service Corps. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Died. | Died. | Invalided. | Died. | Invalided. | Admitted. | Died. | Invalided. |
| | I. *General Diseases.* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Febrile Group ... | 19·9 | .. | .. | 36·5 | ·38 | .. | 56·6 | ·21 | ·72 | 37·4 | ·70 | .. | 50·1 | ·44 | .. | 152·5 | ·56 | .. | 78·0 | 1·31 | .. | ·33 | ·64 | .. | 1·44 | .. | 61·6 | ·61 | .. |
| 2 | Constitutional ,, ... | 106·8 | 7·45 | 7·45 | 156·0 | 1·88 | 11·68 | 133·1 | 3·10 | 10·96 | 209·5 | 2·82 | 13·22 | 148·0 | 3·28 | 10·52 | 136·7 | 5·65 | 7·34 | 155·9 | 4·19 | 12·86 | 2·34 | 7·08 | 3·22 | 8·65 | 10·05 | 101·5 | 3·63 | 7·86 |
| | II. *Local Diseases.* Diseases of the— | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Nervous System ... | 9·1 | ·83 | 3·31 | 9·5 | ·50 | 3·01 | 11·4 | ·41 | 3·10 | 6·2 | 1·06 | 1·41 | 8·9 | ·56 | 3·28 | 13·6 | 1·13 | 2·82 | 15·1 | ·24 | 2·87 | ·67 | 2·57 | .. | 1·44 | 4·32 | 10·3 | .. | 1·81 |
| 2 | Eye ... ... ... ... | 9·1 | .. | 1·65 | 8·2 | .. | ·68 | 11·5 | .. | 2·07 | 6·3 | .. | ·18 | 15·8 | .. | 1·57 | 8·5 | .. | .. | 16·9 | .. | 2·15 | .. | .. | .. | .. | .. | 9·7 | .. | ·69 |
| 3 | Ear ... .. ... ... | 1·6 | .. | ·83 | 1·6 | .. | ·63 | 3·9 | .. | ·21 | 1·4 | .. | ·18 | 3·2 | .. | ·35 | 7·4 | .. | .. | 2·0 | .. | ·66 | .. | .. | .. | .. | .. | 1·8 | .. | .. |
| 4 | Nose ... .... .... | .. | .. | .. | ·1 | .. | .. | ·1 | .. | .. | .. | .. | .. | ·2 | .. | .. | 1·1 | .. | .. | ·4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 5 | Circulatory System ... | 4·1 | ·83 | 1·65 | 7·8 | 1·38 | 4·14 | 14·2 | 2·27 | 7·34 | 4·8 | 1·94 | 1·94 | 9·3 | ·89 | 4·91 | 11·9 | 1·70 | 7·34 | 17·0 | 1·79 | 7·65 | ·67 | 6·43 | .. | 1·44 | 2·88 | 7·3 | 1·81 | 3·63 |
| 6 | Absorbent ,, ... | 16·6 | .. | .. | 12·7 | .. | .. | 12·2 | .. | ·10 | 12·0 | .. | .. | 10·4 | .. | ·06 | 6·8 | .. | .. | 18·3 | .. | ·12 | .. | .. | .. | .. | .. | 7·9 | .. | .. |
| 7 | Ductless Glands ... ... | .. | .. | .. | .. | .. | ·12 | .. | .. | .. | .. | .. | .. | ·1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 8 | Respiratory System ... | 65·4 | .. | .. | 63·9 | 1·63 | 3·89 | 87·6 | 1·03 | 1·55 | 58·3 | 1·06 | 1·06 | 67·6 | 1·24 | 2·34 | 99·4 | 1·13 | ·57 | 102·4 | 2·27 | 3·83 | 2·01 | ·64 | .. | 5·76 | 1·44 | 47·1 | 1·81 | 1·81 |
| 9 | Digestive ,, ... | 121·7 | .. | .. | 73·9 | ·88 | 3·64 | 103·2 | ·72 | 4·55 | 85·7 | ·35 | ·88 | 86·4 | ·38 | 3·37 | 172·3 | ·56 | 3·95 | 131·0 | ·84 | 3·47 | .. | ·64 | ·64 | .. | .. | 77·3 | .. | 6·04 |
| 10 | Urinary ,, ... | 48·0 | ·83 | ·83 | 85·5 | ·25 | 1·38 | 108·7 | ·31 | 1·35 | 78·2 | ·18 | ·70 | 105·9 | ·12 | ·41 | 134·5 | .. | ·57 | 133·8 | ·36 | ·84 | 1·01 | ·64 | .. | 2·88 | 1·44 | 77·9 | ·60 | .. |
| 11 | Generative ,, ... | 5·8 | .. | ·83 | 14·2 | .. | ·63 | 17·0 | .. | ·10 | 5·6 | .. | ·53 | 9·5 | .. | ·28 | 10·2 | .. | 1·13 | 13·4 | ·12 | ·48 | .. | .. | .. | .. | 1·44 | 13·9 | .. | .. |
| 12 | Organs of Locomotion ... | 2·5 | .. | .. | 5·8 | .. | 1·63 | 4·1 | ·10 | 1·55 | 4·9 | ·35 | ·70 | 3·7 | .. | 1·01 | 9·0 | .. | 1·13 | 4·3 | ·12 | 1·08 | .. | .. | .. | 1·44 | .. | 1·8 | ·60 | ·60 |
| 13 | Cellular Tissue ... ... | 22·4 | .. | .. | 22·3 | .. | ·25 | 19·5 | .. | ·10 | 24·5 | .. | ·53 | 19·9 | ·03 | ·12 | 14·1 | .. | ·57 | 23·8 | ·12 | ·42 | .. | .. | .. | .. | .. | 13·3 | .. | .. |
| 14 | Cutaneous System ... | 67·0 | .. | .. | 109·9 | .. | 1·26 | 92·1 | .. | 1·03 | 41·4 | .. | ·18 | 82·7 | .. | ·30 | 120·3 | .. | .. | 117·0 | .. | 1·43 | .. | .. | ·64 | .. | 1·44 | 73·1 | .. | .. |
| | III. *Conditions, &c.* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Debility ... ... ... | 3·3 | .. | .. | 1·2 | .. | 1·18 | 2·6 | .. | 2·07 | 1·6 | .. | ·35 | 3·1 | .. | 1·86 | 1·7 | .. | .. | 9·2 | .. | 2·27 | .. | .. | .. | .. | .. | .. | .. | .. |
| | IV. *Poisons* ... | 3·3 | .. | .. | 2·0 | .. | .. | 1·8 | .. | .. | 1·2 | ·17 | .. | 2·9 | .. | .. | 4·5 | .. | .. | 1·5 | .. | .. | .. | .. | .. | .. | .. | 3·0 | ·60 | .. |
| | V. *Injuries.* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Accidental ... ... ... | 85·2 | .. | ·83 | 108·0 | ·75 | 2·51 | 111·5 | ·21 | 1·65 | 46·4 | ·53 | ·88 | 77·9 | ·59 | ·80 | 122·6 | .. | 2·26 | 89·2 | .. | 1·19 | 1·01 | .. | .. | 1·44 | .. | 93·7 | ·60 | .. |
| 3 | Homicidal ... ... ... | .. | .. | .. | .. | ·13 | .. | .. | .. | .. | .. | .. | .. | .. | ·06 | .. | .. | .. | .. | ·1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 4 | Self-Inflicted ... ... | .. | .. | .. | ·3 | ·75 | .. | ·1 | ·21 | ·10 | ·4 | .. | ·17 | ·1 | ·30 | ·03 | .. | .. | .. | ·2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| | VI. *Surgical Operations.* | .. | .. | .. | ·3 | .. | ·13 | ·1 | .. | ·21 | ·2 | .. | ·17 | ·1 | .. | ·06 | .. | .. | .. | ·2 | .. | ·24 | .. | .. | .. | .. | .. | .. | .. | .. |
| | No Appreciable Disease,, | .. | .. | .. | ·3 | .. | .. | 1·3 | .. | .. | ·9 | .. | .. | ·9 | .. | .. | 1·1 | .. | .. | 1·9 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| | Total ... | 591·9 | 9·94 | 17·38 | 720·0 | 8·52 | 36·66 | 792·6 | 8·57 | 38·76 | 626·9 | 9·16 | 23·08 | 707·1 | 7·89 | 31·37 | 1028·2 | 10·73 | 27·68 | 931·6 | 11·36 | 41·14 | 8·04 | 18·64 | 4·56 | 24·49 | 23·05 | 601·2 | 10·26 | 22·35 |

*United Kingdom.*

*United Kingdom.*

GENERAL DISEASES.—The following Table shows the influence of the principal diseases of this class on the sickness and mortality:—

| General Diseases. | | Annual Ratio per 1,000 of Mean Strength. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Household Cavalry. | Dragoon Guards and Dragoons. | Royal Artillery. | Foot Guards. | Infantry Regiments. | Depôt Brigade, Royal Artillery. | Depôts. | Army Service Corps. |
| *Febrile*— | | | | | | | | | |
| Eruptive Fevers | Admitted | 5·0 | 3·1 | 4·7 | 3·5 | 4·7 | 14·7 | 7·0 | 3·0 |
| | Died | .. | ·12 | .. | .. | .. | .. | ·23 | .. |
| Continued Fevers | Admitted | 10·8 | 21·3 | 16·8 | 22·9 | 20·8 | 24·9 | 26·9 | 10·3 |
| | Died | .. | ·12 | ·21 | ·35 | ·32 | .. | ·84 | .. |
| Paroxysmal Fevers | Admitted | .. | 2·5 | 21·9 | ·2 | 12·9 | 9·0 | 27·7 | 9·1 |
| | Died | .. | .. | .. | .. | .. | .. | .. | .. |
| Influenza | Admitted | 1·6 | 7·2 | 10·0 | 8·5 | 8·0 | 101·1 | 8·5 | 35·0 |
| | Died | .. | .. | .. | .. | .. | .. | .. | .. |
| Erysipelas | Admitted | 1·6 | 1·5 | 2·0 | 1·9 | 2·1 | 1·7 | 2·9 | 2·4 |
| | Died | .. | ·12 | .. | .. | ·06 | ·56 | .. | .. |
| Other Febrile Diseases | Admitted | ·8 | ·9 | 1·2 | ·3 | 1·6 | 1·1 | 4·9 | 1·8 |
| | Died | .. | .. | .. | .. | .. | .. | ·12 | ·60 |
| *Constitutional*— | | | | | | | | | |
| Rheumatism | Admitted | 36·4 | 42·8 | 45·5 | 28·9 | 39·0 | 72·3 | 45·0 | 40·5 |
| | Died | .. | ·12 | ·21 | .. | ·12 | ·56 | ·12 | ·60 |
| Syphilis | Admitted | 52·2 | 99·1 | 75·5 | 163·4 | 93·6 | 45·2 | 86·2 | 51·4 |
| | Died | .. | ·25 | .. | ·18 | ·12 | .. | .. | .. |
| Scrofula, Phthisis, &c. | Admitted | 14·1 | 12·0 | 10·8 | 14·6 | 13·2 | 19·2 | 20·3 | 8·4 |
| | Died | 7·45 | 1·51 | 2·89 | 2·64 | 2·95 | 5·09 | 3·95 | 3·02 |
| Scurvy and Purpura.. | Admitted | .. | ·4 | ·2 | ·2 | ·1 | .. | .. | .. |
| | Died | .. | .. | .. | .. | .. | .. | .. | .. |
| Anæmia | Admitted | ·8 | ·5 | ·7 | 1·7 | 1·2 | .. | 2·3 | .. |
| | Died | .. | .. | .. | .. | .. | .. | .. | .. |
| Other Constitutional Diseases | Admitted | 3·3 | 1·2 | ·4 | ·7 | ·9 | .. | 2·1 | 1·2 |
| | Died | .. | .. | .. | .. | ·09 | .. | ·12 | .. |

*Eruptive Fevers* were more prevalent than in 1869 in the Royal Artillery, its Depôt Brigade and in the Infantry Regiments; the proportion of cases was nearly identical in the two years in the Household Cavalry and Foot Guards, and there was a reduction in the admissions in the Depôts. The high ratio in the Depôt Brigade Royal Artillery arose from the prevalence of scarlet fever at Woolwich, the admissions having amounted to 18 in the two Divisions of the Brigade. The 2nd Battalion 13th Regiment, at Aldershot, had 21 cases of this disease, all of which recovered; the depôt of the 2nd Battalion 60th, at Winchester, had 8 cases and 1 death; the 1st Battalion Coldstreams Guards had 8 cases; and the 5th Dragoon Guards, at Leeds, had 7 and 1 death, being half the number of cases of scarlet fever which occurred among the Cavalry.

*Continued Fevers* were more prevalent than in the preceding year in all the arms, except the Royal Artillery and the Infantry Regiments, in both of which there was a slight decrease. The increase was principally in cases of febricula. There were 7 cases of typhus reported, and of these 4 died, and there were 67 cases and 15 deaths returned as enteric fever. Of the latter, 15 cases and 4 deaths occurred, as already mentioned, in an epidemic which broke out at Pembroke Dock in the month of January.

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*Paroxysmal Fevers* were more prevalent in the Royal Artillery, Infantry Regiments and Depôts than in the preceding year. The excess occurred in corps recently arrived from India. Thus in the Artillery the 14th Brigade had 134 admissions out of a total of 208 in that arm; the 34th Regiment had 166 out of a total of 427 for the Infantry; and the excess in the Depôts occurred entirely among those of corps serving in India.

*Influenza* did not prevail to any great extent except in the Depôt Brigade Royal Artillery, in which the admissions were nearly double the proportion of the preceding year, and ten times the average of the other arms. They occurred chiefly in the spring and winter months among the recruits, who "from their "scanty clothing and bad feeding for some long time previous to enlistment, "suffered more from these diseases than the older soldiers." The ratio of admissions from this disease was high also in the Army Service Corps, but this was fully compensated by a low proportion of cases of bronchitis in it, when compared with the other arms.

*Rheumatism* was less prevalent than in 1869 in all the arms, except the Depôt Brigade Royal Artillery in which there was an increase, chiefly among the old soldiers.

*Syphilis* shows a decrease in the admissions in all the arms but the Household Cavalry; this was most marked in the Depôt Brigade Royal Artillery, the ratio of admissions having been only one-half of that of the preceding year. The highest proportion was still furnished by the Foot Guards, in which it amounted to nearly one-sixth of the strength, and to upwards of one-fourth of the admissions.

The 1st and 2nd Battalions Grenadier Guards, quartered during 10 months, and the 2nd Battalion Coldstream Guards, during the whole year, in London, furnished much the highest ratio of admissions amounting, for the three battalions, to 224 per 1,000. The Scots Fusilier Guards quartered in Dublin 10 months, London 8, and Windsor 6 months, had only 97 admissions per 1,000, and the 1st Battalion Coldstream Guards at Windsor 4 and London 8 months, and the 3rd Battalion Grenadier Guards in London 10 and Windsor 2 months, had respectively 151 and 125 admissions per 1,000 of mean strength.

*Scrofula. Phthisis, &c.*—There has been an increase during the year in the admissions by this group of diseases in the Cavalry of the Line, Foot Guards, and Depôt Brigade Royal Artillery; in the other arms the ratio has not differed materially from the preceding year. The mortality also has been higher in the Household Cavalry and the Depôt Brigade Royal Artillery, but the fluctuations, in these corps, are probably to be accounted for by the smallness of the numbers under observation. The following Table shows the loss occasioned by death and invaliding from these diseases in each arm of the Service.

| | Loss per 1,000 by | | | |
|---|---|---|---|---|
| | Death. | Invaliding. | Death and Invaliding. | |
| | | | 1870. | 1869. |
| Household Cavalry .. .. .. | 7·45 | 6·62 | 14·07 | 16·44 |
| Cavalry of Line .. .. .. | 1·38 | 5·65 | 7·03 | 6·18 |
| Royal Artillery .. .. .. | 2·58 | 5·68 | 8·26 | 8·34 |
| Foot Guards.. .. .. .. | 2·29 | 10·92 | 13·21 | 12·94 |
| Infantry Regiments.. .. .. | 2·87 | 6·27 | 9·14 | 7·51 |
| Depôt Brigade, Royal Artillery .. | 5·08 | 4·52 | 9·60 | 8·75 |
| Depôts .. .. .. .. | 3·95 | 8·61 | 12·56 | 14·22 |

From this Table it appears that the greatest loss by these diseases has fallen on the Household Brigade, the ratio in the Foot Guards being upwards of one-third higher than that of the Infantry of the Line. The proportion on the two years has not varied more than might be expected from the limited numbers under observation.

*United Kingdom.*

LOCAL DISEASES.—The admissions by *diseases of the circulatory system* were, as in the preceding year, much higher in the Depôts and Royal Artillery than in the other arms, but there was a greater proportion of the cases returned under the head of palpitation, indicative of functional rather than of organic disease; it amounted in them to 39 per cent. of the total admissions by diseases of the circulatory system, while in the other arms it was only 29 per cent. The mortality also was higher in the Artillery than in any other arm, and the invaliding higher than in any except the Depôts. This excess in the Artillery may probably depend on the nature of the duties and particularly the gun drill. The high rate of invaliding in the Depôts is probably the result of tropical service in the old soldiers. Aneurism of the aorta continued to furnish the largest proportion of deaths and next to it valve disease of the heart.

*Diseases of the Digestive System* were considerably more prevalent than in 1869 in the Household Cavalry, chiefly from dyspepsia in the 1st Life Guards in London, and also, though to a less extent, in the Royal Horse Guards; and in the Foot Guards, from inflammation of the tonsils in the 3rd Battalion Grenadier and 2nd Battalion Coldstream Guards, and from diarrhœa in the 1st, and dyspepsia in the 2nd Battalion Scots Fusilier Guards. The ratio of admissions was very high in the Depôt Brigade Royal Artillery and the Depôts, the prevailing diseases being tonsillitis and diarrhœa among the recruits resulting probably from the change in their mode of living; there was also a considerable number of admissions by hepatitis among the older soldiers at the Depôts, the result of their previous tropical service.

*Diseases of the Urinary System* were less prevalent than in the preceding year in all the arms, except the Foot Guards in which there was a slight increase. The chief cause of admissions in this class is gonorrhœa, and the Depôt Brigade Royal Artillery and the Depôts furnished a much higher proportion of cases than the other arms. *Bright's Disease* was, as in 1869, the most fatal in this class.

The other classes of diseases have not differed materially from the results of the preceding year, and do not seem to require special remark.

The admissions, deaths, and invaliding in each corps serving during the whole year in the United Kingdom are shown in the following Table:—

| Regiments, &c. | Average Annual Strength. | Admitted into Hospital. | Died. | | | Invalided. | Annual Ratio per 1,000. | | | Stations. | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | In Hospital. | Out of Hospital. | Total. | | Admitted. | Died. | Invalided. | | months. |
| 1st Life Gds. | 406 | 282 | 1 | 1 | 2 | 11 | 694·6 | 4·93 | 27·09 | London | 12 |
| 2nd „ | 401 | 188 | 6 | .. | 6 | 8 | 468·8 | 14·96 | 19·95 | London | 3 |
| | | | | | | | | | | Windsor | 9 |
| R. Horse Gds. | 401 | 245 | 3 | 1 | 4 | 2 | 611·0 | 9·98 | 4·99 | Windsor | 3 |
| | | | | | | | | | | London | 9 |
| Total Household Cavalry | 1,208 | 715 | 10 | 2 | 12 | 21 | 591·9 | 9·93 | 17·38 | | |
| 1st Dr. Gds. | 461 | 214 | 1 | .. | 1 | 19 | 464·2 | 2·17 | 41·21 | Cahir with det. | 6½ |
| | | | | | | | | | | Newbridge, Curragh, and detach. | 5½ |
| 3rd „ | 495 | 482 | 1 | 1 | 2 | 14 | 973·7 | 4·04 | 28·28 | Colchester | 2¼ |
| | | | | | | | | | | Aldershot | 9¾ |
| 4th „ | 479 | 297 | 5 | .. | 5 | 23 | 620·0 | 10·44 | 48·02 | Manchstr., detach. at Liverpool and Northampton | 12 |

| Regiments, &c. | Average Annual Strength. | Admitted into Hospital. | Died. | | | Invalided. | Annual Ratio per 1,000. | | | Stations. | months. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | In Hospital. | Out of Hospital. | Total. | | Admitted. | Died. | Invalided. | | |
| 5th Dr. Gds. | 502 | 344 | 5 | 3 | 8 | 11 | 685·2 | 15·94 | 21·91 | Leeds, det. at Coventry. and Birmingham | 12 |
| 6th „ | 508 | 290 | 2 | 1 | 3 | 21 | 570·9 | 5·91 | 41·34 | Newbridge | 6½ |
| | | | | | | | | | | Dundalk, with det. at Belfast and Belturbet | 5½ |
| 7th „ | 495 | 400 | 5 | 2 | 7 | 15 | 808·1 | 14·14 | 30·30 | Aldershot | 7 |
| | | | | | | | | | | Maidstne.& Shorncliffe | 5 |
| 1st Dragoons | 499 | 290 | 3 | 1 | 4 | 21 | 581·2 | 8·02 | 42·08 | Ballincollig det.at Cork | |
| | | | | | | | | | | Limerick, Fermoy, & Ennis | |
| 2nd „ | 487 | 406 | 3 | 2 | 5 | 46 | 833·7 | 10·27 | 94·46 | Dublin | 6½ |
| | | | | | | | | | | Curragh | 5½ |
| | | | | | | | | | | Detachs. at Longford, Ballinrobe, Athlone, Castlebar, Gort, and Dunmore. | |
| 6th „ | 494 | 461 | 4 | 2 | 6 | 5 | 933·2 | 12·15 | 10·12 | Aldershot | 8 |
| | | | | | | | | | | Brighton& Shorncliffe | 4 |
| 8th Hussars | 502 | 296 | 5 | .. | 5 | 18 | 589·6 | 9·96 | 35·86 | Dundalk | 6½ |
| | | | | | | | | | | Curragh | 3½ |
| | | | | | | | | | | Dublin | 2 |
| | | | | | | | | | | Detach. at Belturbet and Belfast. | |
| 9th Lancers | 486 | 382 | .. | 2 | 2 | 22 | 786·0 | 4·12 | 45·27 | Hounslow, &c. | 7 |
| | | | | | | | | | | Aldershot | 4 |
| 10th Hussars | 522 | 421 | 5 | 4 | 9 | 8 | 806·5 | 17·24 | 15·33 | Brighton & Shorncliffe | 5½ |
| | | | | | | | | | | Aldershot | 1½ |
| | | | | | | | | | | Hounslow, &c. | 6 |
| 12th Lancers | 519 | 395 | 3 | .. | 3 | 22 | 761·1 | 5·78 | 42·39 | Dublin | 4 |
| | | | | | | | | | | Aldershot | 8 |
| 13th Hussars | 520 | 489 | 2 | .. | 2 | 3 | 940·4 | 3·85 | 5·77 | York | 3½ |
| | | | | | | | | | | Det. at Sheffield. | |
| | | | | | | | | | | Edinburgh | 8½ |
| | | | | | | | | | | Det. at Perth, and Hamilton. | |
| 14th „ | 508 | 164 | 1 | .. | 1 | 17 | 322·8 | 1·97 | 33·46 | Longford | 6⅔ |
| | | | | | | | | | | Cahir | 5⅔ |
| | | | | | | | | | | with detach. at several stations | |
| 17th Lancers | 488 | 404 | 4 | 1 | 5 | 27 | 827·9 | 10·25 | 55·33 | Edinburgh & Hamilton | 3½ |
| | | | | | | | | | | Dublin | 8½ |
| Total Cavalry of Line | 7,965 | 5,735 | 49 | 19 | 68 | 292 | 720·0 | 8·54 | 36·66 | | |

*United Kingdom.*

| Regiments, &c. | Average Annual Strength. | Admitted into Hospital. | Died. In Hospital. | Died. Out of Hospital. | Died. Total. | Invalided. | Annual Ratio per 1,000. Admitted. | Annual Ratio per 1,000. Died. | Annual Ratio per 1,000. Invalided. | Stations. |
|---|---|---|---|---|---|---|---|---|---|---|
| Rl. Artillery: | | | | | | | | | | months. |
| B Brigade R.H.A. | 1,012 | 820 | 6 | .. | 6 | 31 | 810·3 | 5·93 | 30·63 | A .. Woolwich<br>B .. Aldershot<br>C .. Woolwich<br>D .. Norwich<br>E .. Dorchester |
| Brigade R.H.A. | 979 | 756 | 3 | .. | 3 | 53 | 772·2 | 3·06 | 54·14 | A .. Aldershot 12<br>B { Newbridge 9½ Dublin 2⅔<br>C { Dublin 6½ Curragh & Newbridg 5⅔<br>D .. Woolwich 12<br>E { Manchester 9 Sheffield 3 |
| Riding Establishment | 214 | 150 | 1 | .. | 1 | 10 | 700·9 | 4·67 | 46·73 | Woolwich 12 |
| 4th Bgde. R.A. | 1,32 0 | 983 | 11 | 3 | 14 | 44 | 744·7 | 10·60 | 33·33 | A .. Fermoy 12<br>B .. Dublin 12<br>D { Limerick 5 Curragh 4½ Newbidge 2⅔<br>E { Clonmel and Waterford } 12<br>F { Athlone 5 Limerick 7<br>G .. Kilkenny 12<br>H { Woolwich 2 Ipswich 3½<br>K .. Woolwich 5½ |
| 7th Brigade. | 760 | 639 | 1 | 1 | 2 | 25 | 840·8 | 2·63 | 32·89 | Woolwich<br>Shoeburyness<br>Sheerness<br>Isle of Wight & Gosport |
| 11th „ | 1,430 | 1,155 | 10 | 1 | 11 | 53 | 807·7 | 7·69 | 37·06 | A { Woolwich & Weedon<br>B .. Hilsea<br>C { Aldershot & Shorncliffe<br>D .. Woolwich<br>E { Shorncliffe & Aldershot<br>F .. Shorncliffe<br>G { Aldershot & Hilsea<br>H { Hilsea & Aldershot |
| 12th „ | 772 | 807 | 7 | .. | 7 | 51 | 1,045·3 | 9·07 | 66·06 | Portsmouth and Channel Islands |
| 13th „ | 756 | 429 | 4 | 2 | 6 | 11 | 567·5 | 7·94 | 14·55 | No.1 { Plymth. 6 PmbkeDk 6<br>Nos. 2,3,4 { Plymth. 12<br>Nos. 5 & 7 { Plymth. 6 Ireland 6<br>No.6 { Ireland 6 Plymth. 6<br>No.8 { PmbkeDk 6 Ireland 6 |

*United Kingdom.*

| Regiments, &c. | Average Annual Strength. | Admitted into Hospital. | Died. In Hospital. | Died. Out of Hospital. | Died. Total. | Invalided. | Annual Ratio per 1,000. Admitted. | Annual Ratio per 1,000. Died | Annual Ratio per 1,000. Invalided. | Stations. | months. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 14th Brigade | 1,092 | 958 | 15 | 1 | 16 | 59 | 877·3 | 14·65 | 54·03 | A&B Woolwich | 12 |
| | | | | | | | | | | C Devonport | 12 |
| | | | | | | | | | | D Edinburgh | 12 |
| | | | | | | | | | | E Woolwich | 7 |
| | | | | | | | | | | E Shobrynss | 5 |
| | | | | | | | | | | F Woolwich | 9 |
| | | | | | | | | | | F Sheerness | ½ |
| | | | | | | | | | | F Shobrynss | 2½ |
| | | | | | | | | | | G Woolwich | 9 |
| | | | | | | | | | | G Shobrynss | 3 |
| | | | | | | | | | | H Woolwich | 7½ |
| | | | | | | | | | | H Shobrynss | 4½ |
| 17th „ | 739 | 372 | 10 | 1 | 11 | 17 | 503·4 | 14·88 | 23·00 | Nos. 1 & 3 Dublin | 4 |
| | | | | | | | | | | Nos. 1 & 3 Dover | 8 |
| | | | | | | | | | | Nos. 4 & 5 Dover | 4 |
| | | | | | | | | | | Nos. 4 & 5 Ireland | 8 |
| | | | | | | | | | | Nos. 2 & 6 Dover | 12 |
| 21st „ | 600 | 599 | 5 | 1 | 6 | 21 | 998·3 | 10·00 | 35·00 | Portsmouth & Isle of Wight | 4½ |
| | | | | | | | | | | Woolwich | 7½ |
| Total Royal Artillery | 9,674 | 7,668 | 73 | 10 | 83 | 375 | 792·6 | 8·58 | 38·76 | | |
| Foot Guards: Gren. Gds., 1st Bn. .. | 806 | 548 | 5 | 1 | 6 | 12 | 679·9 | 7·44 | 14·88 | Dublin | 2 |
| | | | | | | | | | | London | 10 |
| 2nd Bn. .. | 807 | 517 | 5 | .. | 5 | 21 | 640·6 | 6·19 | 26·02 | London | 10½ |
| | | | | | | | | | | Aldershot | 1½ |
| 3rd Bn. .. | 809 | 485 | 5 | 1 | 6 | 13 | 599·5 | 7·42 | 16·07 | Windsor | 2 |
| | | | | | | | | | | London | 10 |
| Coldm. Gds., 1st Bn. .. | 810 | 500 | 5 | 4 | 9 | 27 | 617·3 | 11·11 | 33·33 | London | 8 |
| | | | | | | | | | | Windsor | 4 |
| 2nd Bn. .. | 822 | 532 | 10 | 1 | 11 | 22 | 647·2 | 13·38 | 26·76 | London | 12 |
| Scots F. Gds., 1st Bn. .. | 816 | 595 | 4 | 1 | 5 | 36 | 729·2 | 6·12 | 22·22 | London | 2 |
| | | | | | | | | | | Dublin | 10 |
| 2nd Bn. .. | 804 | 380 | 6 | 4 | 10 | | 472·6 | 12·43 | | London | 6 |
| | | | | | | | | | | Windsor | 6 |
| Total Foot Guards | 5,674 | 3,557 | 40 | 12 | 52 | 131 | 626·9 | 9·16 | 23·09 | | |
| 2nd Foot, 2nd Bn. | 613 | 505 | 2 | .. | 2 | 21 | 823·8 | 3·26 | 34·26 | Portsmouth | 10 |
| | | | | | | | | | | Devonport | 2 |
| 3rd Foot, 2nd Bn. | 607 | 376 | 1 | 1 | 2 | 16 | 619·4 | 3·29 | 26·36 | Aldershot | 3⅔ |
| | | | | | | | | | | Shorncliffe | 8⅓ |
| | | | | | | | | | | Det. at Isle of Grain | 3 |
| 4th Foot, 1st Bn. | 606 | 525 | 7 | .. | 7 | 35 | 866·3 | 11·55 | 57·76 | Dover | 2⅔ |
| | | | | | | | | | | Aldershot | 9⅓ |
| 4th Foot, 2nd Bn. | 620 | 398 | 3 | 1 | 4 | 6 | 641·9 | 6·45 | 9·68 | Chester | 12 |
| | | | | | | | | | | Det. at Weedon & Liverpool | |
| 5th Foot, 2nd Bn. | 599 | 354 | 2 | 1 | 3 | 50 | 591·0 | 5·00 | 83·47 | Glasgow & Ayr | 12 |

*United Kingdom.*

| Regiments, &c. | Average Annual Strength. | Admitted into Hospital. | Died. | | | Invalided. | Annual Ratio per 1,000. | | | Stations. | months. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | In Hospital. | Out of Hospital. | Total. | | Admitted. | Died. | Invalided. | | |
| 6th Foot, 2nd Bn. | 580 | 377 | 2 | .. | 2 | 13 | 650·0 | 3·45 | 22·41 | Newport & Brecon | 3 |
| | | | | | | | | | | Pembroke Dk. | 6⅓ |
| | | | | | | | | | | Buttevant with det. | 2⅔ |
| 7th Foot, 2nd Bn. | 587 | 435 | 6 | 1 | 7 | 10 | 741·1 | 11·92 | 17·04 | Aldershot | 2 |
| | | | | | | | | | | Portland & Weymouth | 10 |
| 8th Foot, 2nd Bn. | 612 | 564 | 2 | 2 | 4 | 8 | 921·6 | 6·54 | 13·07 | Ashton, Bury, & Burnley | 9½ |
| | | | | | | | | | | Manchester | 2½ |
| 9th Foot, 2nd Bn. | 644 | 458 | 5 | 4 | 9 | 16 | 711·2 | 13·97 | 24·84 | Warley with det. | 5⅔ |
| | | | | | | | | | | Aldershot | 6⅓ |
| 12th Foot, 1st Bn. | 598 | 528 | 5 | .. | 5 | 13 | 882·9 | 8·36 | 21·73 | Carlisle & Preston with det. | 12 |
| 13th Foot, 2nd Bn. | 704 | 639 | 4 | .. | 4 | 18 | 907·7 | 5·68 | 25·57 | Aldershot | 9¼ |
| | | | | | | | | | | Pembroke Dk. | 2¾ |
| 15th Foot 2nd Bn. | 609 | 461 | 3 | 1 | 4 | 14 | 757·0 | 6·57 | 22·99 | Dublin | 6½ |
| | | | | | | | | | | Channel Isles | 5½ |
| 16th Foot 2nd Bn. | 554 | 358 | 4 | .. | 4 | 17 | 646·2 | 7·22 | 30·69 | Curragh & Drogheda | 8½ |
| | | | | | | | | | | Canterbury & Chatham with det. | 3½ |
| 17th Foot, 2nd Bn. | 633 | 755 | 4 | 1 | 5 | 2 | 1,192·7 | 7·90 | 3·16 | Channel Isles | 6⅔ |
| | | | | | | | | | | Aldershot | 5⅓ |
| 18th Foot, 1st Bn. | 722 | 547 | 6 | .. | 6 | 9 | 757·6 | 8·31 | 12·46 | Belfast | 5⅔ |
| | | | | | | | | | | Birr | ⅔ |
| | | | | | | | | | | Curragh with det. | 5⅔ |
| 20th Foot, 1st Bn. | 605 | 302 | 5 | 2 | 7 | 13 | 499·2 | 11·57 | 21·49 | Kilkenny | 6⅓ |
| | | | | | | | | | | Cork with det. | 5⅔ |
| 22nd Foot, 1st Bn. | 567 | 283 | 2 | 1 | 3 | 34 | 499·1 | 5·29 | 59·96 | Cork | 5⅔ |
| | | | | | | | | | | Kinsale with det. | 6⅓ |
| 22nd Foot, 2nd Bn. | 581 | 373 | 6 | .. | 6 | 14 | 642·0 | 10·33 | 24·10 | Sheffield | 9 |
| | | | | | | | | | | Aldershot | 3 |
| 23rd Foot 1st Bn. | 638 | 432 | 6 | 1 | 7 | 33 | 677·1 | 10·97 | 51·72 | Devonport | 10 |
| | | | | | | | | | | Newport with det. | 2 |
| 23rd Foot 2nd Bn. | 603 | 440 | .. | 1 | 1 | 21 | 729·7 | 1·66 | 34·83 | Aldershot | 3 |
| | | | | | | | | | | Chatham with det. | 9 |
| 25th Foot 1st Bn. | 694 | 410 | 2 | .. | 2 | 25 | 590·8 | 4·57 | 36·02 | Portsmouth | 12 |
| 27th Foot .. | 615 | 531 | 10 | 1 | 11 | 15 | 863·4 | 17·89 | 24·39 | Chatham | 2⅔ |
| | | | | | | | | | | Colchester | 9⅓ |
| 30th „ .. | 596 | 340 | 5 | 2 | 7 | 27 | 570·5 | 11·75 | 45·30 | Waterford with det. | 2¼ |
| | | | | | | | | | | Dublin | 9¾ |
| 33rd „ .. | 611 | 457 | 4 | 2 | 6 | 17 | 748·0 | 9·82 | 27·82 | Portsmouth | 1¼ |
| | | | | | | | | | | Aldershot | 10¾ |
| 34th „ .. | 611 | 559 | 4 | .. | 4 | 13 | 914·9 | 6·55 | 21·28 | Shorncliffe | 12 |
| 35th „ .. | 631 | 455 | 7 | 1 | 8 | 34 | 721·1 | 12·68 | 53·88 | Bradford | 9 |
| | | | | | | | | | | Newcastle with detach. | 3 |

*United Kingdom.*

| Regiments, &c. | Average Annual Strength. | Admitted into Hospital. | Died. In Hospital. | Died. Out of Hospital. | Died. Total. | Invalided. | Annual Ratio per 1,000. Admitted. | Annual Ratio per 1,000. Died. | Annual Ratio per 1,000. Invalided. | Stations. | months. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 40th Foot .. | 543 | 378 | 4 | 3 | 7 | 18 | 696·1 | 12·89 | 33·15 | Mullingar with detach. | 12 |
| | | | | | | | | | | Aldershot | 12 |
| 42nd „ .. | 590 | 309 | 3 | .. | 3 | 12 | 523·7 | 5·08 | 20·33 | Dublin | 7 |
| | | | | | | | | | | Fermoy with det. | 5 |
| 43rd „ .. | 591 | 467 | 7 | 1 | 8 | 12 | 790·2 | 13·54 | 20·30 | Enniskillen | 2½ |
| | | | | | | | | | | Armagh | ½ |
| 44th „ .. | 687 | 446 | 6 | 1 | 7 | 26 | 649·2 | 10·19 | 37·85 | Newry | 3½ |
| | | | | | | | | | | Curragh withdetach. | 5½ |
| | | | | | | | | | | Portmouth | 4⅔ |
| 45th „ .. | 619 | 486 | 3 | 1 | 4 | 24 | 785·1 | 6·46 | 38·77 | Winchester | 5⅓ |
| | | | | | | | | | | Aldershot | 2 |
| | | | | | | | | | | Curragh | ½ |
| 47th „ .. | 615 | 414 | 5 | .. | 5 | 36 | 673·2 | 8·13 | 58·54 | Dublin | 8½ |
| | | | | | | | | | | Limerick with det. | 3 |
| 50th „ .. | 622 | 352 | 5 | 2 | 7 | 4 | 565·0 | 11·24 | 6·42 | Bristol with det. | 12 |
| | | | | | | | | | | Portland & Weymth. | 2 |
| 51st „ .. | 585 | 231 | 3 | .. | 3 | 34 | 394·9 | 5·12 | 58·12 | Waterford with det. | 10 |
| | | | | | | | | | | Athlone | 2 |
| 54th „ .. | 696 | 420 | 5 | .. | 5 | 21 | 603·4 | 7·18 | 30·17 | Castlebar | 6½ |
| | | | | | | | | | | Curragh with detach. | 3½ |
| | | | | | | | | | | Dublin | 2 |
| 56th „ ... | 650 | 433 | 4 | 1 | 5 | 30 | 651·0 | 7·69 | 46·15 | Athlone | 7⅓ |
| | | | | | | | | | | Curragh with detach. | 2⅔ |
| 57th „ .. | 615 | 463 | 3 | 2 | 5 | 11 | 752·8 | 8·13 | 17·89 | Devonport | 12 |
| 60th Foot 4th Bn. | 672 | 525 | 6 | .. | 6 | 19 | 781·2 | 8·93 | 28·27 | Aldershot | 9 |
| | | | | | | | | | | Colchester | 3 |
| 65th Foot .. | 796 | 442 | 3 | .. | 3 | 33 | 555·3 | 3·77 | 41·46 | Fermoy | 12 |
| 67th „ .. | 652 | 747 | 6 | .. | 6 | 12 | 1145·7 | 9·20 | 18·40 | Aldershot | 12 |
| | | | | | | | | | | Cork | 6⅓ |
| 68th Foot .. | 627 | 365 | 2 | .. | 2 | 23 | 582·1 | 3·19 | 36·68 | Kilkenny | 2⅓ |
| | | | | | | | | | | Templemore | 3⅓ |
| | | | | | | | | | | Limerick | 7 |
| 70th „ .. | 643 | 437 | 3 | .. | 3 | 8 | 679·6 | 4·66 | 12·44 | Dublin with detach. | 5 |
| 72nd „ .. | 776 | 340 | 1 | .. | 1 | 14 | 438·1 | 1·29 | 18·04 | Buttevant | 9⅕ |
| | | | | | | | | | | Cork | 2⅘ |
| 80th „ .. | 623 | 385 | .. | 3 | 3 | 31 | 618·0 | 4·82 | 49·75 | Birr | 5⅘ |
| | | | | | | | | | | Belfast | 6⅕ |
| | | | | | | | | | | Edinburgh | |
| 90th „ .. | 599 | 371 | 9 | 1 | 10 | 15 | 619·4 | 16·69 | 25·04 | Greenlaw, & Dundee | 12 |
| | | | | | | | | | | Dover | 5⅔ |
| 91st „ .. | 597 | 353 | 5 | 1 | 6 | 10 | 591·3 | 10·05 | 16·75 | Aldershot | 6⅓ |
| | | | | | | | | | | Woolwich | 5⅔ |
| 94th „ .. | 613 | 709 | 8 | 2 | 10 | 26 | 1156·6 | 16·31 | 42·41 | Aldershot | 6⅓ |
| 97th „ | 603 | 451 | 3 | .. | 3 | 19 | 747·9 | 4·97 | 31·51 | Dover | 12 |

*United Kingdom.*

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 98th Foot .. | 686 | 478 | 4 | .. | 4 | 9 | 696·8 | 5·83 | 13·12 | Newcastle with det. | 9 |
| | | | | | | | | | | Curragh with det. | 3 |
| 99th „ .. | 595 | 415 | 3 | .. | 3 | 23 | 697·5 | 5·04 | 38·66 | Portsmouth | 3 |
| | | | | | | | | | | I. of Wight | 9 |
| 100th „ .. | 611 | 365 | 3 | .. | 3 | 6 | 597·4 | 4·91 | 9·82 | Manchester | 9½ |
| | | | | | | | | | | Bury with detach. | 2½ |
| 101st „ .. | 576 | 447 | 3 | 1 | 4 | 52 | 776·0 | 6·94 | 90·28 | Portsmouth | 5 |
| | | | | | | | | | | Aldershot | 7 |
| 2nd Bn., Rifle Brig. | 648 | 407 | 5 | 2 | 7 | 21 | 628·1 | 10·80 | 32·41 | Aldershot | 8 |
| | | | | | | | | | | Dover | 4 |
| 4th Bn., Rifle Brig. | 652 | 421 | 3 | 1 | 4 | 18 | 645·7 | 6·13 | 27·61 | Aldershot | 8 |
| | | | | | | | | | | Shorncliffe | 4 |
| Total Infantry Regiments | 33,823 | 23,919 | 222 | 45 | 267 | 1,061 | 707·2 | 7·89 | 31·37 | | |
| Depôt Bgde. Royal Art.— | | | | | | | | | | | |
| 1st Division.. | 584 | 768 | .. | .. | .. | 24 | 1315·1 | .. | 41·10 | Woolwich | 12 |
| 2nd „ .. | 1,186 | 1,052 | 15 | 4 | 19 | 25 | 887·0 | 16·02 | 21·08 | Woolwich | 12 |
| Total .. | 1,770 | 1,820 | 15 | 4 | 19 | 49 | 1028·2 | 10·73 | 27·63 | | |
| Cav. Depôts | 628 | 603 | .. | .. | 6 | 94 | 960·2 | 9·55 | 149·68 | | |
| Infantry „ | 7,734 | 7,187 | .. | .. | 89 | 1,009 | 929·3 | 11·51 | 130·46 | | |
| Total .. | 8,362 | 7,790 | .. | .. | 95 | 1,103 | 931·6 | 11·36 | 131·91 | | |

In the Household Cavalry the admissions and invaliding were highest in the 1st, and the deaths in the 2nd Life Guards. The excess of admissions was chiefly in bronchitis, dyspepsia, and contusions. The admissions were lowest in the 2nd Life Guards.

In the Cavalry of the Line the 3rd Dragoon Guards, at Colchester and Aldershot, had the highest ratio of admissions, the 10th Hussars at Brighton, Shorncliffe, and Hounslow, of deaths, and the 2nd Dragoons, at Dublin and the Curragh, of invaliding. The 14th Hussars, at Longford and Cahir, had the lowest ratio both of admissions and deaths, and the 13th Hussars, at York and Edinburgh, of invaliding. Syphilis and gonorrhœa, ulcers, and rheumatism were the principal causes of the excess in the admissions in the 3rd Dragoon Guards.

In the Royal Artillery the 12th Brigade had the highest ratio of admissions, the 17th the highest of deaths and the 12th of invaliding; the lowest ratio of admissions being in the 17th, of deaths in the 7th, and of invaliding in the 13th Brigade.

In the Foot Guards the ratio of admissions was highest in the 1st Battalion Scots Fusilier Guards in Dublin, of deaths in the 2nd Battalion Coldstream Guards in London, and of invaliding in the Coldstream Guards. The 2nd Battalion Scots Fusilier Guards at London and Windsor furnished the lowest pro-

portion of cases, the 1st Battalion Scots Fusilier Guards of deaths, and the Grenadier Guards of invaliding. The excess of admissions in the 1st Battalion Scots Fusilier Guards, was chiefly from gonorrhœa, ulcers, and wounds.

Among the Infantry regiments the 94th Foot, at Woolwich and Aldershot, had the highest ratio of admissions, the excess being from rheumatism, bronchitis, tonsillitis, and gonorrhœa, the deaths were highest in the 27th at Chatham and Colchester, and the invaliding in the 101st at Portsmouth and Aldershot. The lowest ratios of admissions, deaths, and invaliding respectively were in the 51st Regiment at Weymouth and Waterford, the 72nd at Buttevant, and the 2nd Battalion 17th Regiment in the Channel Islands and at Aldershot.

RE-VACCINATION.—The results of vaccination in 2,275 soldiers and 21,148 recruits as shown by the monthly vaccination returns, of which a summary will be found in No. 2, in the Appendix, were as follows :—

| | Total number Vaccinated. | Results. | Ratio per 1,000. In those who bore marks of previous Small-Pox. | In those who bore good marks of previous Vaccination. | In those who bore doubtful marks of previous Vaccination. | In those who bore no marks of previous Vaccination or Small-pox. | Total. |
|---|---|---|---|---|---|---|---|
| Soldiers, not Recruits | 2,275 | A perfect Vaccine Pustule | 341·1 | 336·6 | 271·8 | 507·9 | 327·9 |
| | | A modified ditto | 325·6 | 377·6 | 408·4 | 269·9 | 376·7 |
| | | A failure.. .. .. .. | 333·3 | 285·8 | 319·8 | 222·2 | 295·4 |
| | | Total.. .. .. .. | 1000·0 | 1000·0 | 1000·0 | 1000·0 | 1000·0 |
| Recruits.. | 21,148 | A perfect Vaccine Pustule | 334·6 | 356·9 | 497·0 | 595·4 | 370·6 |
| | | A modified ditto | 318·8 | 358·6 | 324·7 | 220·4 | 348·5 |
| | | A failure.. .. .. .. | 346·6 | 284·5 | 178·3 | 184·2 | 280·9 |
| | | Total.. .. .. .. | 1000·0 | 1000·0 | 1000·0 | 1000·0 | 1000·0 |

Compared with the preceding year this Table shows an increase of successful results among the soldiers, not recruits, and a decrease of cases of modified pustule. Among recruits, there was an increase of the proportion of perfect vaccine pustules in all the four classes, a decrease of modified vaccine pustules in all except the men who bore marks of previous smallpox, and a decrease of failures in all except those bearing doubtful marks of vaccination. The proportion of successful cases was higher, and of modified pustules and failures lower among the recruits than among the soldiers.

The following Table shows the state of vaccination among the recruits primarily inspected during the year at the Head-Quarters of the Recruiting Districts :—

*United Kingdom.*

| Recruiting Districts. | Marks of Small-Pox. | Marks of Vaccination. | No satisfactory Marks. | Proportion in every 1,000 Primarily Inspected. Marks of Small-Pox. | Marks of Vaccination. | No satisfactory Marks. |
|---|---|---|---|---|---|---|
| London .. .. .. | 226 | 5,326 | 113 | 39·9 | 940·2 | 19·9 |
| Portsmouth .. .. | 9 | 217 | 7 | 38·6 | 931·4 | 30·0 |
| Devonport .. .. | 9 | 137 | 14 | 56·2 | 856·3 | 87·5 |
| Bristol .. .. .. | 15 | 200 | 2 | 69·1 | 921·7 | 9·2 |
| Birmingham .. .. | 20 | 373 | 34 | 46·8 | 873·6 | 79·6 |
| Peterborough .. .. | 3 | 34 | 20 | 52·6 | 596·5 | 350· |
| Manchester .. .. | 17 | 316 | 17 | 48·6 | 902·8 | 48·6 |
| Liverpool .. .. | 53 | 598 | 19 | 79·1 | 892·5 | 28·4 |
| York .. .. .. | 2 | 126 | 6 | 14·9 | 940·3 | 44·8 |
| Edinburgh .. .. | 29 | 245 | 6 | 103·6 | 875·0 | 21·4 |
| Glasgow .. .. .. | 50 | 337 | 61 | 111·6 | 752·2 | 136·2 |
| Inverness .. .. .. | 2 | 21 | .. | 87·0 | 913·0 | .. |
| Belfast .. .. .. | 2 | 26 | 7 | 57·1 | 742·9 | 200·0 |
| Dublin .. .. .. | 28 | 494 | 11 | 52·5 | 926·9 | 20·6 |
| Total { England .. | 354 | 7,327 | 232 | 44·7 | 926·0 | 29·3 |
| Total { Scotland .. | 81 | 603 | 67 | 107·9 | 802·9 | 89·2 |
| Total { Ireland .. | 30 | 520 | 18 | 52·8 | 915·5 | 31·7 |
| Total .. | 465 | 8,450 | 317 | 50·4 | 915·3 | 34·3 |

There has been a decrease upon the results of the preceding year in the number of men wholly unprotected in all three divisions of the United Kingdom; Scotland still furnishes a much higher proportion of these than either England or Ireland. There has been a general increase in the proportion protected by vaccination. The proportion of men bearing marks of smallpox was lower in England and higher in Scotland than in 1869, and in Ireland was identical in the two years; and was much higher in Scotland than in either of the other countries, a result which might be anticipated from the relative proportions in each found to be unprotected by vaccination.

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SANITARY REPORT.

*Camp of Aldershot.*

Inspector-General Lawson reports:—

While the admissions and mortality were more numerous in 1870 than in 1869, the duration of each case has been upwards of a day less, and the average sickness, per man, has been only a small fraction greater. The rate of mortality from disease of the lungs and phthisis was much the same in both years; that from diseases of the heart and arteries one-third greater in 1870.

No permanent sanitary defect has presented itself during the year. There was great deficiency of rain during the summer months, and it became necessary to cut off the supply of water from the Bamley Waterworks to the lavatories and ablution rooms in the permanent barracks and South Camp, but enough was continued for cooking and drinking. That for ablution has to be drawn from wells.

A few cases of typhoid fever were met with, apparently in consequence of the prolonged drought having exhausted the water in the sinks of the surface drains, thereby permitting the emanations from these to be diffused. Orders had

been issued to pour water into the sinks from time to time while the drought continued, but it is doubtful whether these had been properly obeyed.

The West Infantry Block has been completed with ventilating shafts and grates, and two blocks of married quarters containing single rooms were erected for the East Cavalry Barracks and the Centre Infantry Block.

The cubic space in barracks and hospitals and the means of ventilation, except as mentioned above, remained unchanged. In the huts, in some cases in consequence of the large accession of recruits, the numbers were increased beyond the 18 beds that were commonly in use in 1869.

The means for cooking continue ample, and the quality of the rations was generally good.

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*Camp of Colchester and District.*

Deputy Inspector-General Heffernan, in his Sanitary Report for Colchester, after alluding in detail to the various sanitary arrangements in the buildings, &c., of the Command, enumerates the following as requiring to be remedied:—

*Camp, Colchester.*—System of latrines defective; the dry earth plan might easily be introduced.

Provision for infectious cases insufficient; an isolated hut, divided into wards, should be erected for their reception.

*The sanitary improvements* carried out during the year were not extensive, attention having been chiefly given to current repairs, and remedying defects of surface drainage. The women's latrines have been extended and reappropriated; and the enclosing and planting of the Abbey field, which is situated between the camp and the cavalry barracks, have been commenced. When completed this work will be a great improvement, and will add to the salubrity both of the camp and cavalry barracks.

*Warley.*—Latrines insufficient for the number of the men. Ablution rooms quite unfit for use in such a climate as that of England, being little better than open sheds, and affording no protection from the weather. An insufficient number of boilers in the women's wash-house.

*Landguard Fort.*—Latrines too far from the barracks, and in too exposed a situation; also of bad construction. New ones in a better place urgently required.

*Ipswich.*—Rooms generally badly constructed.

*Norwich.*—Rooms generally badly constructed. Latrines both of the barracks and hospital of bad construction.

As regards the prevalence of venereal diseases, Deputy Inspector-General Heffernan remarks—

"1. The provisions of the Contagious Diseases Act have been in force at "Colchester since the end of the year 1868; and there has been a hospital open "for the reception of diseased women during that time.

"2. Night ablution rooms exist in the camp and barrack, but they do not "appear to be much used by the soldiers. I fear it will never be possible to "induce the men to take much trouble in that direction.

"3. There is a remarkable immunity from venereal diseases, attributable "entirely, in my opinion, to the beneficial effects of the Act above alluded to. "In the year 1867, the admissions of syphilitic and gonorrhœal diseases were "in the proportion of 500 per average annual strength of 1,000; in 1868 they "were in the proportion of 537; in 1869 of 221, and in 1870 of 178. These "facts speak for themselves, and require no comment."

The deaths are more numerous than they were last year, and also than the general average at home of late years; but this appears to be an accidental circumstance, as the causes of death are not confined to any particular class of disease, and is compensated in some degree by the fact of the rate of mortality in the previous year having been excessively low.

*United Kingdom.*

*Dover.*

Deputy Inspecter-General Guy reports that but few of the so-called acute preventible diseases have occurred.

Of the four cases of enteric fever two occurred in recruits, who contracted the disease before joining the station, and the third patient caught the malady whilst on furlough.

The good effect of the precautionary measures in instituting a careful examination of all soldiers and their families, and re-vaccinating such as did not bear satisfactory marks, is shown by the fact that, although small-pox has prevailed in all towns where the troops have been quartered, only two mild cases have occurred amongst the military. Attacks of scarlet fever have been more frequent, especially amongst the children.

Additional hospital accommodation for the treatment of infectious diseases is much needed at Dover; immediate removal of the infected person offering the only prospect of stamping out the disease. Marquees are available for this purpose, but for a very limited period of the year. In the winter proper isolation may be said to be practically impossible; it is therefore to be hoped that the recommendation for the erection of a suitable building for the treatment of such cases will be sanctioned and carried out without delay.

Owing to the occurrence of scarlatina, the families of the 91st Regiment, at much inconvenience to themselves and others, were detained ten days at Dover after the departure of the corps for Aldershot. The prevalence of the same disease in the 97th Regiment caused the men of that corps also to be delayed a month.

The good health of the troops may, in a great measure, be ascribed to the generally good sanitary condition of the barracks and their environs.

In the long casemated barracks, owing to inadequate ventilation, it has been found advisable to reduce the number of men accommodated therein.

The water supply is plentiful and pure. The rations are of good quality, and contain a due amount of fresh vegetables. The night duty has been moderate, and proper hours have been selected for military exercise and parades.

Facilities for nightly personal ablution exist at all the stations, but it is doubtful if these are much used.

The Contagious Diseases Act has been strictly enforced at Dover and Shorncliffe, and the admissions for venereal disease at these stations contrast very favourably with those at Canterbury, where it was almost a dead letter.

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*Chatham.*

Deputy Inspector-General O'Flaherty, C.B., remarks:—

The reports from the Medical Officers of the several stations in the Chatham district do not attribute the diseases that have occurred in the past year to any existing sanitary defects in the barracks under their charge, and their reports are in accordance with my own observations and experience.

The sanitary defects still existing in the district are few, and for the most part not removable, being chiefly such as pertain to old or ill-constructed barracks and defective sites, such as vicinity of marshes, low-lying grounds, moats, and ditches of forts, and other defensive works, which must, under any circumstances, be necessarily occupied by troops.

The efforts made during recent years to increase the cubic space allotted to each soldier in barracks, to give better ventilation, new grates, good latrines and improved drainage, good water supply, with generally improved conservancy of barrack grounds and their vicinities, are now nearly completed in this district.

The general health of the troops in the district during the past year has been good, and no epidemic disease has occurred among them.

*United Kingdom.*

Mr. O'Flaherty, in alluding to the objectionable system of urine tubs, advocates the use of crockery chambers and pails, such as are now issued to the hospital beds in the medical establishments of the army.

"Another defect which has recently arisen in barrack services requires "notice here, it is the defective warming of barrack-rooms in winter, owing to "the scale for issue of coal introduced into the Control Regulations of this year, "by which the rooms are now heated by an amount of coal regulated by the "number of occupants of a room, and not as formerly by the heating capacity "of the recently introduced ventilating grates, which are of various sizes and "calculated to properly heat each room according to its size. The grate is "an excellent one for its purpose, and the experiments to ascertain its neces- "sary supply of fuel so practically made and calculated for, that the coal issued "for the week was, with care, quite equal to giving sufficient warmth, and I "respectfully recommend that the previous scale be reverted to, which gave "an issue per grate and not per person as at present."

The sanitary improvements that have been made during 1870 in the district are,—*Gravesend*, an ablution and bath-room to hospital; *Maidstone*, an excellent gymnasium; *Chatham*, *Lower Barracks*, completion of the improvements by removal of dividing walls of front and back rooms, making two rooms into one, reducing occupation, and increasing light and cubic space per man; *Brompton Barracks*, new prison cells have been completed at back of guard-room, and an important sanitary improvement has been put in practice throughout the district, by the order of Major-General Brownrigg, C.B., who has forbidden the confinement of men in the guard-rooms at night, unless when drunk or riotous, a change the importance of which, in a sanitary sense, will be easily appreciated by all experienced in regimental service.

The Act of Parliament for the prevention of venereal diseases is in operation in this district, at Chatham, Sheerness, Maidstone, and Gravesend. An excellent hospital, with all the necessary services, has been opened, but never yet fully occupied; the operations of the Act are successfully conducted by Metropolitan Police.

In each barrack night urinals have been placed for personal ablution; I am informed that they were not much used.

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*Woolwich.*

Deputy Inspector-General J. G. Inglis, C.B., reports:—

The average strength of the garrison has been much higher than before, but the increase has not affected the health of the troops. From the reduction of the naval establishments of Woolwich, the Marine barracks and infirmary vacated by the division of Royal Marines, have been placed at the disposal of the garrison, affording a large amount of extra accommodation for troops.

As regards the Royal Artillery Barracks, I would only repeat an old recommendation. It would be desirable in the front range, where the strength of the building will admit of it, to have the front and rear rooms thrown into one, and the separating walls removed. It has been done in some instances with good effect. This would be particularly advantageous in the upper rooms, where the ceilings are very low. A question regarding the sufficiency of means for warming and ventilating the rooms in the Marine barracks has usually been raised each winter. There are no fire-places in the sleeping rooms. Heat is supplied in the following manner:—Down an external shaft is drawn, by a revolving fan, pure cold air; this air is warmed by being forced over heated iron cases, and is then passed on by pipes to the rooms, where it enters at one end through a perforated grating. It is not easy to control the supply of hot air, for a window or a door opened in a room, especially if there be a strong wind, retards or entirely frustrates the ingress of the hot air. Complaints are, therefore, continually arising about the inequality of its distribution, and its effects on the ventilation of the rooms, for if the flow of hot air is impeded, so also is perflation, which in a great measure depends on it; the other means of ventilation, whether natural or applied, being subsidiary. To remedy these defects, the construction of fire-places with ventilating

*United Kingdom.*

grates, on the Galton principle, in lieu of the combined hot air and ventilating apparatus, has been suggested. Fire-places, also, are more cheerful to the men in winter, while the very uniformity of temperature the hot air blast is supposed to furnish is not equally agreeable to all constitutions, some men liking more or less heat, according to circumstances, and a fire-place alone can furnish this. I have no other defects meriting special mention to record connected with the barrack accommodation of the troops at Woolwich. By the latest measurements the average amount of space allotted to each man throughout has been 658 cubic and 50 superficial feet.

The conservancy of latrines, urinals, and ash-pits is duly attended to both in huts and barracks; the two former are daily as regularly and freely flushed as circumstances will permit; the stable-litter and contents of the ash-pits are regularly removed under contract. With all care, however, it is impossible to prevent, under the existing system of construction, the odours arising from the latrines. It becomes a question whether these effluvia would not be susceptible of remedy by some adaptation of the dry earth system? Among the sanitary defects which most prominently attracted my notice at my half-yearly inspections are those connected with the ablutionary and bath arrangements of the barracks in possession of the Army Service Corps, late Military Train. The lavatories are those formerly used by the sick when the barracks constituted the Royal Artillery Hospital, and are situated on each floor of the building in close proximity to the several rooms. The wood forming the floors is in a rotten and saturated state, and seems incompatible with a sound sanitary condition. There is want, also, of privacy and general comfort in the entire arrangements, while the baths are so few in number as to be utterly inadequate for the services they are intended. The only remedy is the construction of new lavatories and a sufficient system of baths in the neighbourhood of the other subsidiary buildings outside. The erection of a private ablution room in this barracks is also desirable.

The hut barracks on Woolwich Common have continued very healthy; the allotment, about 23 men to a hut, is not, as a rule, exceeded. This allotment seems large, but from the construction of the huts, and their generally good ventilation, no evil effects from over occupation are apparent.

I have nothing new to record in regard to the food supply during the period. I have heard of no alterations in the scale of the soldier's diet, while the rations appear to have been as well cooked and varied as the regulations under which they are issued and prepared will admit of. In fact, I have had no complaints, except one occasionally preferred of insufficiency in the amount of the meat ration, and on this point I would reiterate my opinion that a pound of meat, deducting bone in this climate, as the daily animal food would not be too much for a robust adult of the soldier's age; and considering the heavy duties gunners and men of the mounted branch of the service generally perform, a moderate increase in the amount of beef or mutton seems only reasonable.

With regard to the prevalence of venereal disease during the period, there appears to be a steady decrease in the ratio of admissions from syphilis, and the return for the period under review shows that there have been fewer admissions from this form of disease out of the average strength of this year (exceeding 6,000 men) than is exhibited in the aggregate of 1869. In gonorrhœal complaints, however, they have somewhat increased.

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*Southern District.*

Deputy Inspector-General Meikleham reports:—

During the year 1870 several improvements were carried out as regards the accommodation in the barracks and hospitals in the southern district, and many alterations that were found desirable from time to time have been recommended, and steps taken to obtain authority for their execution.

The number of beds in the Garrison Hospital, Portsea, has, during the year, been reduced from 300 to 176, so as to give every patient the regulated 1,200 feet of cubic space.

In consequence of this loss of accommodation, the Mill Dam Hospital is kept in reserve to meet any possible requirements. *United Kingdom.*

The new hospital for soldiers' wives and children was opened in November, and the hut formerly used for this purpose converted into an hospital for infectious diseases, one half for men, the other half for women and children.

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*Netley.*

Inspector-General Beatson, C.B., reports :—

The admissions into the Royal Victoria Hospital during the year 1870 have amounted to :—

| | |
|---|---|
| Invalids from Foreign Stations .. .. .. | 3,200 |
| From Stations at Home .. .. .. .. | 2 |
| Army Hospital Corps .. .. .. .. | 163 |
| Garrison Patients .. .. .. .. | 26 |
| Total .. .. .. | 3,391 |

The garrison patients were men from the detachment Army Service Corps at Netley, Guardsmen from London, and men of the Royal Engineers stationed in Southampton.

*Invalids.*—Of this class 2,035 arrived from India by the overland route and 472 by the Cape of Good Hope, making in all 2,507, or 121 less than the previous year.

The highest number in hospital on any one day during the year was 925 on the 12th April and during 88 days the numbers were over 500. The average daily sick for the year was 362, and the smallest number in hospital on any one day 102.

*Transport of Invalids from Portsmouth to Netley.*—The men after landing at Portsmouth have come on invariably by rail without any inconvenience or any great discomfort: what discomfort did occur will, for the future, be in a great measure, if not entirely, removed by the use of the new ambulance carriage built for this service and now completed and fit for use. It has been described by Professor Longmore, by whom it was inspected while in course of construction, and by whom, as well as by myself, it is considered to be all that is required.

One additional requirement, however, is still needed in connection with the transport of invalids by rail to Netley, and that is, an extension of the line by a tramway from the Netley Station to the hospital.

*Swimming Bath.*—The arrangements for filling this bath are more satisfactory since the erection of the steam-engine on the site where the windmill formerly stood.

*Officers' Quarters.*—I would here again refer to the remarks in my last year's Sanitary Report as to the necessity for married quarters being built near the hospital for a certain number of the Senior Officers—Surgeons-Major, and Surgeons. No houses are procurable at all near the hospital, and the unavoidable result is the residence of nearly all the Senior Officers at far too great a distance. I consider the evil an especial one in the case of the Medical Officer in charge of the lunatic hospital, where a resident Medical Officer, not a visiting Physician, is required.

The married soldiers' huts and the barracks of the Army Hospital Corps are in good order.

The lunatic hospital has been occupied since July last, and the average number of patients daily has been 64.

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*United Kingdom.*

*Western District.*

Deputy Inspector-General Gallwey reports the following as the leading sanitary improvements that have been effected in the course of the year in the district under his medical charge.

1. Completion of children's hospital in Old Granby Barracks, consisting of two wards, of cook-house, and small laundry.

2. Introduction of an additional window into prisoner's room, West Gate Guard, (North) Raglan Barracks.

3. Cementing (with Portland cement) of officers' quarters in South Raglan Barracks, previously hardly habitable from damp, now made dry and comfortable.

4. The ventilation in all the barrack rooms of Raglan Barracks has been improved. The rain was wont to beat down upon the men's beds through the ventilating shafts. The lower end of the shafts have now been provided with up cast louvres, and the evil corrected. Galvanized iron screens have been fixed to the upper ends on the S. and S.W. (or wet and windy) sides, and the joints made tight with canvas and tar.

5. Two of the cook-houses in the same barracks have been much improved by the removal of obsolete and useless boilers and ovens, thus, also, much increasing the cubic space ; and the cook-house in South Raglan Barracks has been provided with a new cooking apparatus.

6. The prisoner's room in New Granby Barracks, and the Clock Tower Guard in the Raglan Barracks have been improved by additional means of ventilation in the former, and of light as well as ventilation in the latter.

7. The prisoner's room in Mount Wise Barracks has been warmed.

8. At the Military Hospital, Stoke, steps have been taken to secure the wards from draughts.

9. The laundry fitments in the same establishment have been put into thorough working order, and a new steam coil provided for the apparatus for boiling linen.

10. The main drain of Devonport, emptying itself into the sea under Mount Wise, has been repaired.

11. New water-closets have been supplied to the officers' quarters, South Raglan Barracks, and for both guard-rooms in same barracks.

12. Additional ventilation has been provided in cook and washhouses in the Citadel, Plymouth, and the dung pits at officers' stables (in Citadel) have been improved.

13. Several of the rain-water tanks throughout the garrison have been thoroughly cleansed.

14. Privies at the married soldiers' barracks have been improved.

15. Gas is being laid on at Horfield Barracks, Bristol. Laundry accommodation extended in the same barracks, and new baths have been provided. A new meat shed erected.

16. At Prince of Wales Redoubt patent water closets for men and women have been substituted for the ordinary cesspits.

17. A new gymnasium is in course of erection, adjoining Raglan Barracks.

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*Northern District of England.*

Deputy Inspector-General Carte reports :—

The northern district has been very healthy during the period. I can trace no evidence of disease having arisen from any want of sanitary care in the several barracks and hospitals. However, some defects in the sanitary condition of these have been represented from time to time by the several Medical Officers in charge, and in most cases due attention has been paid by the authorities.

The drain on the foreshore at Fleetwater, which was too short originally, and reported to be very offensive occasionally, has been remedied by being lengthened 40 feet. *United Kingdom.*

Very numerous improvements and additions have been effected throughout the district by the Royal Engineers for the period 1870 and 1871.

Scarlatina and small-pox appeared in Salford Barracks in the 100th Regiment, but these diseases did not spread. Isolation is one of the most important objects to be attained, and I regret to add that the manner of carrying it out is very imperfect, generally speaking, on account of the difficulty of attaining a suitable isolated place, especially in such barracks as Manchester and Salford.

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*North Britain.*

Deputy Inspector-General Rutherford, C.B., reports :—

In the various sanitary reports of the Medical Officers in charge of regiments and detachments in the command, there does not appear to be any special allusion to insanitary defects as productive of disease.

The Surgeon-Major, 13th Hussars, states that the position of the barracks at Piershill, would be a healthy one but for the sewage farm which surrounds it from the N.W. by the N. to the E. When these winds blow, the smell in the square and barracks is most offensive and disagreeable; fortunately they are cold winds. "The rooms are over the stables, but there is not any "effluvium, the latter being ceiled, and ventilating shafts being provided. They "are not model rooms, from a sanitary point of view, but answer well enough, "when there is not any epidemic disease."

*Detachment 13th Hussars at Hamilton.*—The Medical Officer states that, "the number of men allotted to each room is excessive." "No disease "attributed to it." "Some of the cases of syphilis have been of a severe "character." "Much scarlatina in the town; only one case in barracks."

*Leith Fort.*—The Medical Officer in charge of the Battery, Royal Artillery, stationed here, considers that the general construction of the men's quarters is "faulty, and conducive to draughts. The amount of coal allowed (37lbs. "to every 12 men) is insufficient to supply the grates in each room." The defect was represented, and an extra allowance granted. "In the dry "weather the drains were offensive." No means of warming the "lock-up room"—a matter of little importance, as it was not used."

*90th Light Infantry, Head-Quarters Edinburgh Castle.*—The Surgeon states that the regiment, having only just returned from Indian service, suffered very much during the cold and changeable weather at the beginning of the year from affections of the respiratory system, but for the last seven months, the health has been gradually improving.

*Detachment of 90th Light Infantry, Dundee.*—The Medical Officer in charge states that "the accommodation for ablution in barracks is not sufficient. " . . No tubs or baths for the men. . . No bathing parades have been "held, and this want is greatly felt. . . The cooking arrangements "are very defective, there being no means of varying the diets; there "are no ovens for baking. . . The latrines are of the simplest descrip- "tion, and capable of much improvement. . . The means of cooking "the hospital diets have not been satisfactory, consisting of a common open "kitchen fire, and a boiler too large to cook the rations of so few patients as there "are generally in hospital. . . The health of the troops has been remark- "ably good, and the general sanitary condition of the barracks satisfactory."

*93rd Highlanders, Head-Quarters Aberdeen.*—The Surgeon states that "the "construction of the latrines and urinals is very bad, and the surface drainage "defective. . . The drainage in the immediate vicinity of the hospital is "very defective, the contiguous buildings being stables and pig houses. . . "He does not consider Aberdeen to be a good station for troops to be sent to "immediately after their return from India, as the east winds, which prevail, "invariably produce relapses from hepatic affections and malarious fevers."

*United Kingdom.*

*Detachment of 93rd Highlanders, Fort George.*—The Medical Officer in charge says, "the climate is well calculated to keep men healthy, or to restore "to health those who have suffered from residence at enervating tropical "stations. Even those men who have suffered from dysentery and hepatitis, "I have observed to steadily regain health and strength here. . . Allow- "ance of fuel found insufficient; an increase granted on application. . . No "means of cooking except by boiling . . . Cells are damp and badly "ventilated; they have not been used."

*Detachment of 93rd Highlanders, Stirling.*—The Medical Officer observes: "The climate of Stirling has been variable during the year, causing changes "in the temperature, which have had a marked effect in producing attacks of "ague in men of a weak constitution, who had previously suffered from the "disease in India."

*Detachment of 93rd Highlanders, Perth.*—The Medical Officer says that "the prevalence of Ague during the spring and summer months, was entirely "attributable to previous residence in India. . . There has been no over- "crowding or defective ventilation."

*Glasgow, 2nd Battalion, 5th Fusiliers.*—New barracks being in course of construction at Glasgow (as I understand), nothing remains to be said on the sanitary condition of the old ones.

*Detachment, 2nd Battalion, 5th Regiment, Ayr.*—"The privies attached to "the Officers' quarters have been changed to water-closets during the year, "and are now very good. . . The barrack square has been tile-drained. " . . In the town for a long time scarlet fever was very prevalent, but only "two cases occurred amongst the children. . . Venereal affections are "more frequent than would be imagined, and are a large item in the yearly "returns; but they are not virulent, and, as a rule, are very amenable to "treatment."

Several sanitary improvements have been effected during the year in the barracks and hospitals in the command.

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## IRELAND.

Inspector-General Dane reports:—

There has been at some stations insufficient cubic space for the troops, but this has been unavoidable on account of the large force stationed in Ireland; it will, however, be seen that the health of the troops has been very good, and not influenced to any appreciable extent by the want of a full amount of accommodation, though in some cases it has been most properly brought to notice by the executive as well as administrative officers of the department.

The latrines at many stations are most objectionable, and it has been urgently recommended by the Commanding Royal Engineer and myself that the dry earth system should be introduced without delay, but I regret to add that this service is not yet effected in the great majority of the barracks.

Considering the prevalence of diseases of the zymotic class among the civil population, and, to a considerable extent, among the troops and their families, the condition of the troops must be viewed as satisfactory.

The diminution of venereal disease in the Curragh District is obviously the result of the good working of the Contagious Diseases Act; and I see no reason to suppose that similar results would not follow at Cork, if the Act is rigidly enforced in that locality.

I have observed with regret the absence of physical vigour in the frames of many of the young soldiers in the command as contrasted with the men of former years, and consider that a return to the old four company depôt system would be valuable, as affording time for the influence of good food and regular work to mature the frame of the recruit before sending him on foreign service.

I have noticed that it was in contemplation to establish General Depôt Battalions; from my experience of the system for three years, and my long regimental employment, I believe a depôt, combining regimental *esprit* with the other advantages, makes the most efficient, healthy, and best disciplined soldier.

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*Northern District of Ireland.*

*United Kingdom.*

Surgeon-Major Vere Webb in submitting the annual Sanitary Report of the troops stationed in the Northern (Dublin) District of Ireland, compiled from the reports furnished by various Medical Officers, dwells upon the relative diminution of sickness and mortality in 1870 as compared with the average of previous years.

"Scarlatina prevailed to a great extent during the year, principally amongst the children of Her Majesty's 30th Regiment quartered in the Royal Barracks and occupying quarters in the married block, Arbour Hill. A few deaths occurred amongst the children but none amongst the adults who suffered from the disease. Measles prevailed to some extent amongst the children of the 6th Dragoon Guards quartered at Dundalk, but no fatal cases are recorded. The same disease also appeared amongst the children of the 1st Battalion 16th Regiment and Depôt 53rd Foot stationed at Newry, but no fatal cases were reported."

"The hospital accommodation throughout the division may be considered fairly good, but many improvements have been recommended. The ablution rooms of the hospital at Arbour Hill have long been the cause of complaint, but their defects, I am happy to say, have been considered and will be remedied during the coming year."

"During this year a great boon has been conferred upon the married people of regiments quartered in the Dublin Garrison in the shape of an infectious hospital for women and children in connection with the hospital at Portobello Barracks. The ward, which will accommodate nine patients, has been entirely isolated by a brick partition from the other parts of the hospital, and is under the management of a nurse (detailed from the regulated number of women trained for that purpose and employed at the Female Hospital, Montpellier Hill), under the medical superintendence of the Surgeon in charge of the Army Service Corps. It has proved of immense advantage in cases of scarlatina and other fevers, chiefly enteric, and has, up to the present time, accommodated 37 patients, and been the means of preventing the disease extending itself."

The duties of the troops have not been severe, nor can any disease be traced to their influence. Surgeon-Major Webb proceeds to point out some of the sanitary defects that he noticed at the half-yearly inspection of barracks and hospitals made by him during the absence of Deputy Inspector-General Innes, C.B.

"*8th Hussars, 17th Lancers, 30th Regiment.*—Defective hospital ablution rooms, there being no bath or drainage, and water not being laid on. This has been represented and is to be attended to.

*Castlebar.*—Defective ventilation in the barrack rooms. In the absence of patent ventilators it has been proposed to insert a ventilating pane of glass in the upper sash of each window.

*Ballinrobe.*—The means of procuring water from the river close by, down a steep descent, are considered dangerous. Proposed that a force pump be erected, there being no wells.

*Old Castle.*—A portion of the workhouse had been appropriated as barracks, but the large rooms, married quarters and hospital were over ventilated and unprovided with fireplaces or stoves, and, until the latter were applied for and supplied, the men, women and children were anything but comfortable.

*Cavan.*—No ablution room, a temporary one was being fitted up. The rations could not be varied. Captain Warren's stove recommended.

*Kells.*—Rooms unprovided with either fireplaces or stoves; the latter have been recommended without effect; the excuse is that there is a day room with a fireplace, which the men occupy as a dining room and sit in during the day.

*Trim.*—Married quarters overcrowded and ventilation in barrack rooms imperfect; no ill-effects are traceable, the detachment having been extremely healthy."

*The Curragh Camp and Newbridge.*

*United Kingdom.*

Deputy Inspector-General Lloyd reports:—

1. No special causes affecting the health of the troops have been reported by any of the Medical Officers in the district, and from my own observation I was not aware of any.

The aggregate amount of sickness, as well as that of individual corps, has been moderate, and the whole of the troops may be considered as having enjoyed excellent health throughout the year.

2. The chief sanitary defects are the old cesspits and latrines of the hospitals and Artillery barracks at Newbridge, also at the barracks at Naas, and to a less extent at Carlow.

The want of baths in barrack lavatories, and of both baths and lavatories in hospitals at Naas and Carlow, is also a marked defect.

3. The prominent requirements for the improvement of the sanitary condition of barracks and camp are:—

1st. *Newbridge.*—Water to be laid on in new hospital latrines, also in new lavatories and latrines for Artillery barracks, so that the old cesspits may be filled up.

2nd. *Naas and Carlow.*—Latrines on an improved principle to be substituted for the cesspits now in use; a bath in each ablution room, baths and lavatories, and new cooking range in each hospital, and water laid on.

3rd. *In Camp.*—Additional baths in each square, and some improved form of latrine for general use.

4. The leading sanitary improvements effected during the year were the erection of water-closets at Newbridge Hospital, and an improved form of latrine, urinals, &c., at the Artillery quarters, but none of these are yet in use from want of water. A re-appropriation of the Newbridge barracks has been authorized, giving greater cubic space per man, but not yet carried into effect. The abattoir at the camp has been reconstructed and very much improved.

5. *Venereal Disease.*—1st. The Contagious Diseases Act has been in force at the camp and Newbridge since December 1869. 2nd. Means for nightly private ablution in camp are provided in "B" square only. 3rd. A comparison of the admissions from primary syphilis and gonorrhœa during the year preceding the introduction of the Contagious Diseases Act with those of the year during which it has been in operation, shows a decrease of one-fifth of admissions per 1,000 of strength in favour of the latter, and taking primary syphilis alone, the comparison is still more in favour of the working of the Act, the admissions being nearly one-third less.

As regards the type or form of syphilis, it is satisfactory to be able to state that all the Medical Officers concur in reporting its having assumed a milder and very manageable character.

6. No epidemic disease has prevailed during the year, nor has there been any unusual prevalence of any description of disease attributable to atmospheric influences.

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*Cork District.*

Deputy Inspector-General Prendergast reports:—

*Cork Barracks.*—Scarlet fever has been more or less prevalent in Cork Barracks among the children, and towards the latter part of the year a number of children (14) were under treatment for a mild form.

Scarlet fever has been very prevalent among the civil population in Cork.

*Kinsale.*—Diarrhœa prevailed among the men of the 1st Battalion 22nd Regiment immediately after its arrival at the station in June last, at a period when the water in the wells and tanks was low; the cause was, no doubt, attributable, in one well especially, to pollution by sewage. Active steps were immediately taken, and the nuisance remedied, since which diarrhœa has disappeared.

*Fermoy.*—The Medical Officer in charge of the 43rd Regiment states that several cases of diarrhœa appeared among the recruits, which he attributes to some dietetic errors.

*Buttevant.*—Ten cases of ague were treated, not attributable to any local causes, the disease having occurred in men who had recently returned from India and volunteered into the 72nd Highlanders.

With the above exceptions, the general state of health of the troops in this district during the year has been very good.

*Water Supply.*—During summer and seasons of drought the supply of water in some barracks, such as Fermoy, Kinsale, Templemore, Waterford, and Carlisle Fort, fails, more or less, and has generally to be supplemented by the Control Department. The supply to ablution rooms being scanty and insufficient, especially at Carlisle Fort and Kinsale, has been the subject of correspondence.

On sanitary grounds, and especially where no bathing parades are practicable, as is the case at the above stations, this want of water has been a source of chronic complaint. At Waterford it is to be hoped that the water will be abundant, when the projected water supply to the city is carried out.

As stated in my last year's Report, the water supplied by the six barrack wells at Templemore are all, with the exception of one well (Artesian), quite unfit for drinking purposes; and the latter is only considered by Doctor de Chaumont as "usable water if better cannot be obtained;" to this well the troops are restricted for drinking purposes.

*Latrines and Urinals.*—With the exception of Cork, Buttevant, Camden Fort, the Artillery Barracks, Clonmel, Shambles Barracks, Galway, Birr, and Limerick Barracks, the old cesspit system of latrines prevails through this district. Some of the latrines are in an objectionable condition, urgently requiring to be superseded by a more improved system of conservancy.

The condition of those at Ballincollig is bad, and representations have frequently been made as to their state; but I am informed by the Commanding Royal Engineers, Cork, that, in the year 1872, Moule's system will be introduced.

*Married Quarters.*—The erection of quarters for soldiers' families is urgently required, the custom of a number of families living in one room being very objectionable on moral and sanitary grounds. At Cork and Ballincollig the erection of married quarters has just been commenced.

*Hospitals for Contagious Diseases.*—The provision of accommodation for the treatment of contagious diseases among women and children is much needed in the district. The attention of the authorities has often been called to this want at Cork in particular.

Many sanitary improvements have been effected, during the past year, in the various barracks at the different stations throughout the district.

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## *Section* II.

### *On the Extent of Invaliding.*

The number of invalids discharged the Service, during 1870, from the troops serving in the United Kingdom, and the number from each arm of the Service are shown in the following Table:—

*United Kingdom.*

| | Troops generally. | Household Cavalry. | Dragoon Guards and Dragoons. | Royal Artillery (including the Depôt Brigade). | Foot Guards. | Infantry Regiments. | Depôts. | Royal Engineers and Departmental Corps. |
|---|---|---|---|---|---|---|---|---|
| Strength .. .. .. | 82,035 | 1,208 | 7,965 | 11,444 | 5,674 | 33,823 | 8,362 | 5,232 |
| 1870.. Number discharged as Invalids .. | 2,555 | 21 | 292 | 424 | 131 | 1,061 | 344 | 92 |
| 1870.. Ratio per 1,000 .. | 31·15 | 17·38 | 36·66 | 37·05 | 23·08 | 31·37 | 41·14 | 17·58 |
| 1860–69, Ratio per 1,000 .. .. .. | 34·08 | 16·02 | 29·38 | 26·60 | 27·61 | 28·77 | 39·90 | 11·29 |

The proportion invalided was rather lower than in 1869 in all the arms, except the Cavalry and Infantry Regiments, but was above the average of the preceding ten years in all except the Foot Guards.

The proportion invalided at different periods of service in all the arms, except the depôts, is shown in the following Table. It has been necessary to omit the depôts as, in the returns from them, are included the invalids from foreign stations discharged at Netley, who are borne on the strength of the depôts for administrative purposes, but are accounted for in these Reports under the stations from which they have been invalided :—

| | Ratio per 1,000 of Strength discharged as Invalids. | | | | | |
|---|---|---|---|---|---|---|
| | Under 1 year of Service. | Above 1 and under 5. | Above 5 and under 10. | Above 10 and under 15. | Above 15 and under 20. | 20 and upwards. |
| Household Cavalry .. | 7·94 | 13·89 | 22·36 | 28·09 | 8·00 | 17·70 |
| Cavalry of the Line .. | 13·42 | 31·35 | 34·22 | 42·24 | 36·61 | 111·11 |
| Royal Artillery .. .. | 16·65 | 42·82 | 39·00 | 43·31 | 54·70 | 48·29 |
| Foot Guards .. .. .. | 23·10 | 25·10 | 18·21 | 28·57 | 14·31 | .. |
| Infantry Regiments .. | 8·65 | 30·77 | 25·53 | 38·48 | 35·60 | 26·09 |

The most remarkable points in this Table are the high rates of invaliding from the Foot Guards under one year of service, which will be the subject of particular remark in the section on recruiting, and the high ratio in the Cavalry and Artillery at 20 years and upwards The latter is no doubt due to the circumstance that, in the Infantry, soldiers complete their service for pension at 21 years, while in the Cavalry and Artillery it extends to 24 years. Not only therefore is there a much larger proportion of men above 20 years serving in the latter, but their service extends over four years instead of one year, and consequently increases the probability of their becoming inefficient.

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## *Section* III.

### *On the Number constantly Sick in Hospital of the Troops serving in the United Kingdom.*

The average number of men constantly non-effective from sickness during the year, among the troops generally and in each of the arms, and the average duration of the cases in hospital are shown in the following Table :—

| | | Troops generally. | Household Cavalry. | Cavalry of the Line. | Royal Artillery. | Foot Guards. | Infantry Regiments. | Depôt Brigade Royal Artillery. | Depôt Battalions. |
|---|---|---|---|---|---|---|---|---|---|
| Mean daily sick per 1,000 of strength .. | 1870.. | 38·58 | 29·18 | 37·75 | 42·75 | 39·07 | 41·69 | 46·10 | 38·61 |
| | 1860–9 | 47·82 | 30·87 | 41·24 | 47·99 | 50·25 | 42·24 | 57·74 | 47·90 |
| | | Days. | Days. | Days. | Days. | Days. | Days. | Days. | Days. |
| Average sick time to each Man in the course of the Year .. .. | 1870.. | 14·08 | 10·65 | 13·78 | 15·60 | 14·26 | 15·21 | 16·83 | 14·09 |
| | 1860–9 | 17·45 | 11·27 | 15·05 | 17·52 | 18·34 | 15·42 | 21·07 | 17·48 |
| Average duration of the Cases | 1870.. | 17·41 | 17·99 | 19·14 | 19·69 | 22·75 | 21·52 | 16·36 | 15·13 |
| | 1860–9 | 18·55 | 18·48 | 17·46 | 18·82 | 22·89 | 19·11 | 19·28 | 17·93 |

Compared with the preceding years there has been an increase in the mean sick of the Household Cavalry and Depot Brigade Royal Artillery, and to a very slight extent in the Royal Artillery. In the other Arms there has been a decrease, most marked in the depôts and in the Foot Guards. The greater duration of the cases in the Foot Guards is probably the result of the high proportion of consumption in that portion of the force.

## *Section* IV.

### *On the Influence of Age on the Mortality of Troops serving in the United Kingdom.*

The mortality at different ages, arranged in quinquennial periods of life, in the various arms of the Service, is shown in the following Table compiled from Abstract No. 3 in the Appendix:—

| Corps. | Annual Ratio of Deaths per 1,000 Living, at the following Ages:— | | | | | |
|---|---|---|---|---|---|---|
| | Under 20. | 20 and under 25. | 25 and under 30. | 30 and under 35. | 35 and under 40. | 40 and upwards. |
| Household Cavalry .. .. .. .. | .. | 10·36 | 20·00 | 10·93 | .. | .. |
| Cavalry of the Line .. .. .. .. | 1·66 | 6·68 | 3·53 | 13·63 | 27·03 | 28·71 |
| Royal Artillery .. .. .. .. .. | 1·91 | 4·21 | 18·86 | 14·04 | 30·84 | 13·51 |
| Foot Guards.. .. .. .. .. .. | 3·08 | 8·82 | 9·41 | 11·82 | 23·38 | 16·13 |
| Infantry Regiments .. .. .. .. | 2·18 | 6·05 | 5·91 | 13·99 | 18·17 | 32·61 |
| Depôt and Coast Brigades Royal Artillery, and Depôt Battalions.. | 3·06 | 10·16 | 6·70 | 17·16 | 31·60 | 26·53 |
| Ditto, ditto, 1859-69 .. .. .. .. | 4·88 | 8·76 | 11·71 | 17·69 | 22·54 | 27·11 |
| Average of preceding, exclusive of all Depôts.. .. .. .. .. .. | 2·16 | 6·25 | 6·35 | 13·74 | 21·70 | 23·65 |
| Ditto, ditto, 1859-69 .. .. .. .. | 2·81 | 5·71 | 7·61 | 12·33 | 15·54 | 18·38 |
| Civil Male Population { England and Wales .. | 7·41 | 8·42 | 9·21 | 10·23 | 11·63 | 13·55 |
| Civil Male Population { Healthy Districts. .. | 5·83 | 7·30 | 7·93 | 8·36 | 9·00 | 9·86 |

*United Unitedm.*

This Table shows the mortality among the troops to have been below the average at the lower, and above it at the higher ages, with the exception of a slight increase at the age of 20 and under 25. As remarked in previous Reports the ratio of deaths among the troops exclusive of the depôts has been lower than among the civil population of the healthy districts of England up to the age of thirty, and higher above that age.

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## *Section* V.

### *On the Recruiting of the Army.*

The recruiting returns for the year account for 13,686 men examined at the Head-Quarters of Recruiting Districts, 16,068 at regiments and depôts, and 8,654 by civilian medical practitioners, making a total of 38,408. Of these 11,827 were rejected on primary and 1,108 on secondary inspection, being a total of 12,935 or 336·7 rejected per 1,000 primarily inspected.

The proportion of rejections in each class of recruits is shown in the following Table :—

| | Number of Recruits Primarily Inspected. | Number Rejected. | | | Ratio of Rejections per 1,000 Examined. | |
|---|---|---|---|---|---|---|
| | | Primary Inspections. | Secondary Inspections. | Total. | Primary Inspections. | Primary and Secondary Inspections. |
| At Head-Quarters of Recruiting Districts .. .. .. | 13,686 | 4,454 | 309 | 10,354 | 325·4 | 347·9 |
| At Regiments and Depôts .. .. | 16,068 | 5,591 | | | 347·9 | |
| By Civil Medical Practitioners .. | 8,654 | 1,782 | 799 | 2,581 | 205·9 | 298·2 |
| Total .. .. | 38,408 | 11,827 | 1,108 | 12,935 | 307·9 | 336·7 |

Compared with the results of the preceding year this table shows a reduction in the proportion of rejections on primary inspection at the Head-Quarters of Recruiting Districts and by civilian medical practitioners, while the proportion rejected at regiments and depots was nearly identical in the two years. Including both primary and secondary inspections, there has been a reduction of 30 per 1,000 in the rejections of recruits examined in the first instance by Army Medical Officers, and of 65 per 1,000 in those inspected by civilian medical practitioners, making a reduction in the rejections upon the total inspected of 38 per 1,000.

This Table still shows an immense disproportion in the rejections at secondary inspection of the recruits primarily inspected by Army Medical Officers and civilian practitioners. If the number rejected on primary inspection be deducted from the total inspected there will remain 19,709 primarily inspected by Army Medical Officers, and of these 309 were rejected on secondary inspection, and 6,872 inspected by civilian medical practitioners, with 799 secondary rejections. These numbers give the relative porportion of 16 per 1,000 secondarily rejected of those examined by military, and 116 per 1,000 of those by civilians.

The number of recruits inspected and the préportion rejected at the Head-Quarters of each of the Recruiting Districts are shown in the following Table framed from Abstract No. 4, in the Appendix.

*United Kingdom.*

| Districts. | Total Number Inspected. | | Ratio found Unfit per 1,000 Inspected. | |
|---|---|---|---|---|
| | Primary Inspections. | Secondary Inspections. | Primary Inspections. | Secondary Inspections. |
| London .. .. .. | 7,917 | 2,287 | 284 | 72 |
| Portsmouth .. .. | 438 | 452 | 468 | 92 |
| Devonport .. .. | 243 | 276 | 337 | 123 |
| Bristol .. .. .. | 380 | 615 | 429 | 167 |
| Birmingham .. .. | 565 | 274 | 244 | 98 |
| Peterborough .. .. | 83 | 656 | 313 | 108 |
| Manchester .. .. | 677 | 113 | 483 | 301 |
| Liverpool .. .. .. | 1,039 | 318 | 355 | 170 |
| York .. .. .. | 202 | 529 | 336 | 113 |
| Glasgow .. .. .. | 836 | 102 | 464 | 225 |
| Edinburgh .. .. | 396 | 7 | 293 | 428 |
| Inverness .. .. .. | 26 | 8 | 115 | .. |
| Belfast .. .. .. | 42 | 17 | 166 | 176 |
| Dublin .. .. .. | 842 | 524 | 367 | 89 |
| Total .. .. | 13,686 | 6,178 | 325 | 108 |
| Ratio in 1869 .. .. | .. | .. | 379 | 96 |

There has been a marked reduction in the proportion rejected on primary and an increase on secondary inspections. Owing to a complete redistribution of the country into Districts and the formation of a number of new ones, it is almost impossible to make a fair comparison of the results in the various districts with those of the preceding period.

Of the old Districts Glasgow continued to have the highest proportion rejected at primary inspection, but Portsmouth and Manchester, two of the new districts, gave still more unsatisfactory results, and the latter had also the highest proportion at secondary inspection, if Edinburgh be excepted where the number of secondary inspections amounted only to seven. Omitting Inverness and Belfast where the numbers were very small, the most favourable results on primary inspection were obtained at Birmingham, and on secondary at London.

The native countries of the recruits and the proportion of rejections in each group are shown in the following Table :—

| Native Countries of Recruits. | Head-Quarters of Recruiting Districts. | | Head-Quarters of Regiments and Depôts. | | By Civil Medical Practitioners. | | Subsequently Rejected on Secondary Inspection. | | Total. | | Proportion Rejected per 1,000 Inspected. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inspected. | Rejected. | Inspected. | Rejected. | Inspected. | Rejected. | Of those who had been found fit by Army Surgeons. | Of those who had been found fit by Civilians. | Primarily Inspected. | Rejected at Primary and Secondary Inspections. | |
| England ... ... ... | 10,641 | 3,350 | 12,675 | 4,297 | 7,745 | 1,618 | 216 | 685 | 31,061 | 10,166 | 327·3 |
| Wales ... ... ... | 150 | 36 | 109 | 34 | 169 | 35 | 9 | 25 | 428 | 139 | 324·7 |
| Scotland ... ... ... | 1,183 | 439 | 1,114 | 423 | 238 | 37 | 20 | 30 | 2,535 | 949 | 374·3 |
| Ireland ... ... ... | 1,640 | 599 | 2,044 | 799 | 490 | 90 | 61 | 54 | 4,174 | 1,603 | 384·7 |
| British Colonies and Foreign Countries ... | 72 | 30 | 126 | 38 | 12 | 2 | 3 | 5 | 210 | 78 | 371·4 |
| Total ... | 13,686 | 4,454 | 16,068 | 5,591 | 8,654 | 1,782 | 309 | 799 | 38,408 | 12,935 | 336·7 |

Compared with the preceding year there has been a reduction in the proportion rejected of the natives of England, Wales, and Scotland; but an

*United Kingdom.*

ncrease in the proportion of natives of Ireland rejected, and in those of British Colonies and Foreign countries.

The proportion of recruits furnished by each of the countries in every 1,000 inspected was as follows :—

| | |
|---|---|
| Of England and Wales .... .... .... | 820·0 |
| Scotland .... .... .... .... .... | 66·0 |
| Ireland .... .... .... .... .... | 108·6 |
| Colonies and Foreign Countries .... | 5·4 |

There has been a great increase in the proportion of recruits furnished by England and Wales, a very marked decrease in that by Ireland, and a moderate decrease in the proportion given by Scotland. It seems probable that this difference is in a great measure due to the new arrangements of districts, and the increase of those in England from four to nine, while there has only been an addition of one in Scotland, and no new district has been formed in Ireland.

The numbers inspected for each arm of the Service, and the numbers unfit, are shown in following Table :—

| | Head-Quarters of Recruiting Districts. | | Regiments and Depot Battalions. | | Inspected by Civil Medical Practitioners. | | Total Primary Inspections. | | Rejected on Secondary Inspection. | Total. | | Ratio of Rejections per 1,000 Recruits Inspected. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inspected. | Rejected. | Inspected. | Rejected. | Inspected. | Rejected. | Inspected. | Rejected. | | Inspected. | Rejected. | |
| Household Cavalry ... ... | ... | ... | 201 | 102 | ... | ... | 201 | 102 | 5 | 201 | 107 | 532·3 |
| Cavalry of the Line ... | 1,825 | 534 | 1,034 | 305 | 469 | 102 | 3,328 | 941 | 41 | 3,328 | 982 | 295·1 |
| Royal Artillery and Engineers ... ... ... | 1,036 | 325 | 3,213 | 862 | 814 | 118 | 5,063 | 1,305 | 99 | 5,063 | 1,404 | 277·3 |
| Foot Guards ... ... ... | 76 | 22 | 274 | 94 | 944 | 221 | 1,294 | 337 | 224 | 1,294 | 561 | 433 5 |
| Infantry Regiments and Depôts ... ... ... | 10,749 | 3,573 | 11,346 | 4,228 | 6,427 | 1,341 | 28,522 | 9,142 | 739 | 28,522 | 9,881 | 346·4 |
| Total ... ... | 13,686 | 4,454 | 16,068 | 5,591 | 8,654 | 1,782 | 38,403 | 11,827 | 1,108 | 38,408 | 12,935 | 336·7 |

There has been a decrease in the proportion rejected in all arms of the service, to the least extent in the Household Cavalry and Foot Guards, and to the greatest extent in the Ordnance Corps. It was well marked also in the Cavalry and Infantry Regiments, particularly in the latter.

The influence of the different classes of disabilities as causes of rejection is shown in the following Table :—

**RETURN** showing the Number of Recruits Rejected during the Year 1870, with the Causes arranged in Classes, and the Ratio per 1,000 in each Class.

| Class. | Causes of Rejection, in Classes. | Primary Inspections. | | | | | | | | Rejected on Secondary Inspection. | | Total Rejected on both Primary and Secondary Inspection. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | At Head-Quarters of Recruiting Districts. | | At Head-Quarters of Regiments & Depôts. | | By Civil Medical Practitioners. | | Total. | | Of Recruits previously examined by Army Medical Officers. | Of Recruits previously examined by Civilians. | Of Recruits examined by Army Medical Officers. | | Of Recruits examined by Civil Medical Practitioners. | | Total. | |
| | | 13,686 | | 16,068 | | 8,654 | | 38,408 | | | | 29,754 | | 8,654 | | 38,408 | |
| | | Number Rejected. | Ratio per 1,000. | Number Rejected. | Ratio per 1,000. | Number Rejected. | Ratio per 1,000. | Number Rejected. | Ratio per 1,000. | | | Number Rejected. | Ratio per 1,000. | Number Rejected. | Ratio per 1,000. | Number Rejected. | Ratio per 1,000. |
| 1 | Syphilis | 152 | 11·11 | 314 | 19·54 | 88 | 10·17 | 554 | 14·42 | 14 | 38 | 480 | 16·13 | 126 | 14·56 | 606 | 15·78 |
| 2 | Scrofula | 90 | 6·58 | 112 | 6·97 | 26 | 3·00 | 228 | 5·94 | 8 | 15 | 210 | 7·05 | 41 | 4·74 | 251 | 6·54 |
| 3 | Phthisis | 51 | 3·73 | 103 | 6·41 | 28 | 3·24 | 182 | 4·74 | 5 | 6 | 159 | 5·34 | 34 | 3·93 | 193 | 5·03 |
| 4 | Impaired Constitution | 104 | 7·60 | 141 | 8·78 | 41 | 4·74 | 286 | 7·44 | 9 | 25 | 254 | 8·53 | 66 | 7·63 | 320 | 8·33 |
| 5 | Muscular Tenuity and Debility | 414 | 30·25 | 677 | 42·14 | 43 | 4·97 | 1,134 | 29·53 | 35 | 104 | 1,126 | 37·85 | 147 | 17·00 | 1,273 | 33·15 |
| 6 | Other General Diseases | 62 | 4·53 | 57 | 3·54 | 4 | ·46 | 123 | 3·20 | .. | 14 | 119 | 4·00 | 18 | 2·08 | 137 | 3·57 |
| 7 | Diseases of the Nervous System | 12 | ·87 | 18 | 1·12 | 4 | ·46 | 34 | ·88 | 3 | 8 | 33 | 1·10 | 12 | 1·38 | 45 | 1·17 |
| 8 | Weakness of Intellect | 8 | ·58 | 26 | 1·62 | 2 | ·23 | 36 | ·93 | 4 | 4 | 38 | 1·27 | 6 | ·69 | 44 | 1·14 |
| 9 | Diseases of Eyes and Eyelids | 608 | 44·43 | 637 | 39·65 | 233 | 26·93 | 1,478 | 38·50 | 42 | 117 | 1,287 | 43·26 | 350 | 40·45 | 1,637 | 42·62 |
| 10 | Diseases of Nose and Mouth | 25 | 1·83 | 14 | ·87 | 12 | 1·39 | 51 | 1·32 | .. | 3 | 39 | 1·31 | 15 | 1·73 | 54 | 1·40 |
| 11 | Disease of Ears | 27 | 1·97 | 9 | ·56 | 2 | ·23 | 38 | ·98 | 1 | .. | 37 | 1·24 | 2 | ·23 | 39 | 1·01 |
| 12 | Deafness | 36 | 2·63 | 24 | 1·49 | 9 | 1·04 | 69 | 1·80 | 1 | 2 | 61 | 2·05 | 11 | 1·27 | 72 | 1·87 |
| 13 | Impediment of Speech | 31 | 2·27 | 20 | 1·24 | 2 | ·23 | 53 | 1·37 | 2 | 1 | 53 | 1·78 | 3 | ·34 | 56 | 1·45 |
| 14 | Disease of Heart | 248 | 18·12 | 471 | 29·31 | 143 | 16·53 | 862 | 22·44 | 37 | 58 | 756 | 25·40 | 201 | 23·23 | 957 | 24·92 |
| 15 | Disease of Arteries (Aneurism) | 2 | ·14 | 3 | ·18 | .. | .. | 5 | ·13 | .. | .. | 5 | ·16 | .. | .. | 5 | ·13 |
| 16 | Disease of Veins (Varix) | 290 | 21·19 | 418 | 26·02 | 176 | 20·34 | 884 | 23·02 | 11 | 39 | 719 | 24·16 | 215 | 24·85 | 934 | 24·32 |

RETURN—*continued.*

| Class. | Causes of Rejection, in Classes. | Primary Inspections. | | | | | | | | Rejected on Secondary Inspection. | | Total Rejected on both Primary and Secondary Inspection. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | At Head-Quarters of Recruiting Districts. | | At Head-Quarters of Regiments & Depôts. | | By Civil Medical Practitioners. | | Total. | | | | Of Recruits examined by Army Medical Officers. | | Of Recruits examined by Civil Medical Practitioners. | | Total. | |
| | | 13,686 | | 16,068 | | 8,654 | | 38,408 | | | | 29,754 | | 8,654 | | 38,408 | |
| | | Number Rejected. | Ratio per 1,000. | Number Rejected. | Ratio per 1,000. | Number Rejected. | Ratio per 1,000. | Number Rejected. | Ratio per 1,000. | Of Recruits previously examined by Army Medical Officers. | Of Recruits previously examined by Civilians. | Number Rejected. | Ratio per 1,000. | Number Rejected. | Ratio per 1,000. | Number Rejected. | Ratio per 1,000. |
| 17 | Disease of Lungs (except Phthisis) .. | 75 | 5·48 | 95 | 5·91 | 43 | 4·97 | 213 | 5·54 | 9 | 20 | 179 | 6·01 | 63 | 7·28 | 242 | 6·30 |
| 18 | Loss or Decay of many Teeth .. .. | 165 | 12·06 | 184 | 11·45 | 28 | 3·24 | 377 | 9·81 | 4 | 21 | 353 | 11·87 | 49 | 5·66 | 402 | 10·50 |
| 19 | Hernia .. .. .. .. .. | 123 | 8·99 | 216 | 13·44 | 140 | 16·20 | 479 | 12·47 | 18 | 22 | 357 | 12·00 | 162 | 18·72 | 519 | 13·51 |
| 20 | Laxity of Abdominal Rings .. .. | 119 | 8·70 | 96 | 5·97 | 21 | 2·42 | 236 | 6·14 | 9 | 16 | 224 | 7·53 | 37 | 4·27 | 261 | 6·80 |
| 21 | Hæmorrhoids .. .. .. .. | 91 | 6·65 | 29 | 1·80 | 13 | 1·50 | 133 | 3·46 | 4 | 6 | 124 | 4·17 | 19 | 2·19 | 143 | 3·72 |
| 22 | Diseases of the Urinary Organs .. .. | 10 | ·73 | 12 | ·74 | 15 | 1·73 | 37 | ·96 | 1 | 2 | 23 | ·77 | 17 | 1·96 | 40 | 1·04 |
| 23 | Varicocele .. .. .. .. .. | 253 | 18·49 | 312 | 19·42 | 182 | 21·03 | 747 | 19·45 | 17 | 37 | 582 | 19·60 | 219 | 25·31 | 801 | 20·86 |
| 24 | Other Diseases of the Genital Organs (not Syphilitic).. .. .. .. .. | 30 | 2·19 | 40 | 2·49 | 35 | 4·04 | 105 | 2·73 | 2 | 7 | 72 | 2·42 | 42 | 4·85 | 114 | 2·96 |
| 25 | Defects of Upper Extremities, from Fracture, Contraction, Luxation, &c. .. | 146 | 10·65 | 154 | 9·58 | 43 | 4·97 | 343 | 8·93 | 9 | 29 | 309 | 10·40 | 72 | 8·32 | 381 | 9·92 |
| 26 | Defects of Lower Extremities, from Fracture, Contraction, Luxation, &c. .. | 390 | 28·50 | 271 | 16·90 | 94 | 10·86 | 755 | 19·70 | 15 | 51 | 676 | 22·72 | 145 | 16·76 | 821 | 21·40 |
| 27 | Flat Feet .. .. .. .. .. | 79 | 5·77 | 243 | 15·12 | 49 | 5·66 | 371 | 9·66 | 8 | 27 | 330 | 11·09 | 76 | 8·78 | 406 | 10·57 |
| 28 | Diseases of Joints .. .. .. .. | 23 | 1·68 | 62 | 3·86 | .. | .. | 85 | 2·21 | 5 | 12 | 90 | 3·02 | 12 | 1·38 | 102 | 2·65 |
| 29 | Other Affections of Bones and Muscles .. | 13 | ·95 | 56 | 3·48 | 3 | ·34 | 72 | 1·87 | 2 | 3 | 71 | 2·38 | 6 | ·69 | 77 | 2·00 |
| 30 | Ulcers, Wounds, and Cicatrices .. .. | 126 | 9·21 | 126 | 7·84 | 72 | 8·32 | 324 | 8·44 | 4 | 14 | 256 | 8·60 | 86 | 9·94 | 342 | 8·90 |

RETURN—*continued.*

| Class. | Causes of Rejection, in Classes. | Primary Inspections. | | | | | | | | Rejected on Secondary Inspection. | | Total Rejected on both Primary and Secondary Inspection. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | At Head-Quarters of Recruiting Districts. | | At Head-Quarters of Regiments & Depôts. | | By Civil Medical Practitioners. | | Total. | | | | Of Recruits examined by Army Medical Officers. | | Of Recruits examined by Civil Medical Practitioners. | | Total. | |
| | | 13,686 | | 16,068 | | 8,654 | | 38,408 | | | | 29,754 | | 8,654 | | 38,408 | |
| | | Number Rejected. | Ratio per 1,000. | Number Rejected. | Ratio per 1,000. | Number Rejected. | Ratio per 1,000. | Number Rejected. | Ratio per 1,000. | Of Recruits previously examined by Army Medical Officers. | Of Recruits previously examined by Civilians. | Number Rejected. | Ratio per 1,000. | Number Rejected. | Ratio per 1,000. | Number Rejected. | Ratio per 1,000. |
| 31 | Other Affections of the Cutaneous System. | 77 | 5·63 | 54 | 3·36 | 31 | 3·58 | 162 | 4·22 | 2 | 8 | 133 | 4·47 | 39 | 4·51 | 172 | 4·47 |
| 32 | Malformation of Ears .. .. .. | 1 | ·07 | 3 | ·18 | .. | .. | 4 | ·10 | .. | .. | 4 | ·13 | .. | .. | 4 | ·10 |
| 33 | „ Nose and Mouth.. .. | 17 | 1·24 | 8 | ·49 | .. | .. | 25 | ·65 | 1 | 1 | 26 | ·87 | 1 | ·11 | 27 | ·70 |
| 34 | „ Chest and Spine .. .. | 388 | 28·35 | 459 | 28·60 | 178 | 20·57 | 1,025 | 26·70 | 15 | 64 | 862 | 29·00 | 242 | 28·00 | 1,104 | 28·75 |
| 35 | „ Urinary or Genital Organs | 2 | ·14 | 2 | ·12 | .. | .. | 4 | ·10 | .. | 1 | 4 | ·13 | 1 | ·11 | 5 | ·13 |
| 36 | Marks of Punishment or letters D or B C.. | 33 | 2·41 | 22 | 1·36 | 1 | ·11 | 56 | 1·46 | 5 | 4 | 60 | 2·01 | 5 | ·57 | 65 | 1·69 |
| 37 | Marks of treatment, Blistering, &c. .. | 133 | 9·72 | 103 | 6·41 | 20 | 2·31 | 256 | 6·67 | 7 | 20 | 243 | 8·17 | 40 | 4·62 | 283 | 7·36 |
| | Not specified .. .. .. .. | .. | .. | .. | .. | 1 | ·11 | 1 | ·02 | .. | .. | .. | .. | 1 | ·11 | 1 | ·02 |
| | Total .. .. .. | 4454 | 325·44 | 6591 | 347·96 | 1782 | 205·92 | 11,827 | 307·93 | 309 | 799 | 10,354 | 347·99 | 2581 | 298·25 | 12,935 | 336·78 |

*United Kingdom.*

Compared with the results of the preceding year the rejections at the Head-Quarters of the Recruiting Districts show a considerable reduction under muscular tenuity, varicose veins, defective lower extremities and flat feet, marks of treatment, and heart disease. At the regiments and depots there was an increase in the proportion rejected for muscular tenuity, and a decrease in those for varicose veins and defective lower extremities; and among the recruits inspected primarily by civilian practitioners, the reduction was chiefly under muscular tenuity, varicocele, varix, syphilis, disease of the eyes and eyelids, and of the heart. Taking the general results of primary and secondary inspections, the reduction in the proportion rejected has been most marked in varicose veins and varicocele, defects of lower extremities, muscular tenuity, marks of previous treatment, and to a less extent in disease of the heart. Diseases of the eyes and eyelids were rather more frequent causes of rejection than in 1869, and maintain their position at the head of the list, muscular tenuity, malformation of chest or spine, disease of heart, and varicose veins coming next in point of frequency. The disproportion in the rejections by Medical Officers and civilian practitioners is still very marked in muscular tenuity, loss or decay of many teeth, and defects of lower extremities.

The ages of the recruits enlisted are shown in Abstract No. 6, in the Appendix, from which the following Table has been published:—

| Proportion in 10,000 Examined. | Boys under 17. | 17 to 18. | 18 to 19. | 19 to 20. | 20 to 21. | 21 to 22. | 22 to 23. | 23 to 24. | 24 to 25. | 25 and upwards. |
|---|---|---|---|---|---|---|---|---|---|---|
| At Head Quarters of Recruiting Districts .. | 107 | 515 | 3,306 | 2,094 | 1,249 | 887 | 654 | 532 | 501 | 155 |
| At Regiments and Depôts .. | 307 | 1466 | 2,979 | 1,742 | 1,113 | 748 | 625 | 527 | 364 | 134 |
| By Civil Medical Practioners | 26 | 577 | 3,088 | 2,482 | 1,285 | 822 | 684 | 499 | 461 | 76 |
| Total .. | 172 | 928 | 3,120 | 2,034 | 1,200 | 812 | 649 | 522 | 434 | 129 |

Compared with the preceding year there was an increase in the proportion of men between 18 and 21, and a decrease in the men below and above these ages, with the exception of those between 24 and 25. Nearly two-thirds of the recruits were between 18 and 21.

The proportion of recruits at each height, in 10,000 examined, is shown in the following Table, calculated from Abstract No. 7, in the Appendix.

| Proportion in 10,000. | Inspected at Head-Quarters of Recruiting Districts. | Inspected at Regiments and Depôts. | Inspected by Civil Medical Practitioners. | Total. |
|---|---|---|---|---|
| Ft. In. Ft. In. | | | | |
| Under 5 3 .. | 105 | 226 | 30 | 139 |
| 5 3 to 5 4 .. | 55 | 340 | 10 | 164 |
| 5 4 „ 5 5 .. | 950 | 1,903 | 654 | 1,282 |
| 5 5 „ 5 6 .. | 3,347 | 2,487 | 2,799 | 2,864 |
| 5 6 „ 5 7 .. | 2,568 | 1,911 | 2,607 | 2,302 |
| 5 7 „ 5 8 .. | 1,492 | 1,486 | 1,703 | 1,537 |
| 5 8 „ 5 9 .. | 753 | 841 | 1,114 | 871 |
| 5 9 „ 5 10 .. | 446 | 404 | 615 | 466 |
| 5 10 „ 5 11 .. | 156 | 200 | 286 | 204 |
| 5 11 „ 6 0 .. | 75 | 121 | 122 | 105 |
| 6 0 and upwards | 53 | 81 | 60 | 66 |

There has been a marked increase in the proportion of men from 5 ft. 3 in. to 5 ft. 6 in., and a decrease at all other heights.

The weights of the recruits inspected at the Head-Quarters of the Recruiting Districts, for which group alone the information is available, are shown in the following Table framed from Abstract No. 8, in the Appendix:— *United Kingdom.*

| | | | | | |
|---|---|---|---|---|---|
| | lbs. | | lbs. | | |
| Under | 100 | | | | 113 |
| From | 100 | to | 110 | | 358 |
| „ | 110 | to | 120 | | 2,014 |
| „ | 120 | to | 130 | | 3,232 |
| „ | 130 | to | 140 | | 2,434 |
| „ | 140 | to | 150 | | 1,159 |
| „ | 150 | to | 160 | | 456 |
| „ | 160 | to | 170 | | 172 |
| „ | 170 and upwards | | | | 62 |
| | | | | | 10,000 |

There was an increase in the proportion of the three groups between 100 lbs. and 130 lbs., and a decrease in all the other groups.

The state of education among the recruits is shown in the following Table, framed from Abstract No. 9 in the Appendix. There is no information available on this head respecting those examined by civilian medical practitioners.

| *Of every 1,000 Recruits Examined.* | Unable to Read or Write. | Able to Read only. | Able to Read and Write. |
|---|---|---|---|
| At Head-Quarters of Recruiting Districts | 168 | 81 | 751 |
| At Regiments and Depôts .. .. | 201 | 126 | 673 |
| Total .. .. | 186 | 105 | 709 |

This Table shows a decrease in the proportion able to read and write, and an increase in the proportion able to read only. The proportion totally uneducated enlisted at regiments and depots was more than one-third higher than in 1869, while there was a reduction of a third in the proportion of that class inspected in the recruiting districts. With nearly a fifth of the recruits joining the Army unable to read and write, and a proportion of the remainder able to read only, there appears abundant work for the Army Schoolmasters, and an imperative necessity for the enforcement of those views of compulsory education which have recently been adopted in this country with regard to the civil population.

The following Table shows the occupations previously to enlistment of the recruits inspected, and the proportion of rejections in each group :—

*United Kingdom.*

| Occupations of Recruits. | Number Inspected. | Rejected on Primary Inspection. | Rejected on Secondary Inspection. | Total Rejected. | Ratio per 1,000 Rejected. |
|---|---|---|---|---|---|
| 1. Labourers, Husbandmen, and Servants .. .. .. | 24,834 | 7,626 | 729 | 8,355 | 336·4 |
| 2. Manufacturing Artisans (as Clothworkers, Weavers, Lace Makers, &c.) .. .. | 2,875 | 1,067 | 119 | 1,186 | 412·5 |
| 3. Mechanics employed in Occupations favourable to physical development (as Carpenters, Smiths, Masons, &c.) .. .. .. .. | 7,476 | 2,232 | 192 | 2,424 | 324·2 |
| 4. Shopmen and Clerks .. .. | 2,486 | 787 | 53 | 840 | 337·9 |
| 5. Professional Occupations, Students, &c. .. .. .. | 264 | 80 | 4 | 84 | 318·1 |
| 6. Boys .. .. .. .. | 473 | 35 | 11 | 46 | 97·2 |
| Total .. .. | 38,408 | 11,827 | 1,108 | 12,935 | 336·7 |

There was a decrease upon the results for 1869 in the proportion rejected of labourers &c., and of mechanics employed in occupations favourable to physical development, and to a less extent in clerks and shopmen, while there was an increase in the classes of manufacturing artizans and of professional occupations. The manufacturing artizans furnished much the highest proportion of rejections; the other four classes did not materially differ from each other; the boys of course are quite an exceptional class.

The proportion of recruits from each group of occupations was as follows:—

| | |
|---|---|
| 1. Labourers, Husbandmen, and Servants .. .. .. | 646·6 |
| 2. Manufacturing Artizans (as Clothworkers, Weavers, lace makers, &c.) .. .. .. .. .. .. .. | 74·9 |
| 3. Mechanics employed in occupations favourable to physical development (as Carpenters, Smiths, Masons, &c.) .. | 194·7 |
| 4. Shopmen and Clerks .. .. .. .. .. .. | 64·7 |
| 5. Professional occupations, Students, &c. .. .. .. | 6·8 |
| 6. Boys .. .. .. .. .. .. .. .. | 12·3 |
| Total .. .. .. .. .. | 1,000 |

This shows an increase about 60 per 1,000 in the proportion enlisted of labourers &c., and of about 18 per 1,000 in mechanics employed in occupations favourable to physical development. Nearly two thirds of the recruits are obtained from the first class.

In connection with the alterations recently introduced into the system of recruiting, and particularly with those in the medical examination of recruits, which were briefly noticed in last Report, a very important question has arisen. It has been alleged that an inferior class of men has been obtained, and that the physical qualities of the recruits were much below those of previous periods. If this opinion be correct, the deterioration should be manifest in the number of men who broke down in the first year of their service, and who in consequence were brought forward for discharge as unfit for the duties of a soldier. Unfortunately there are no means of making a comparison with the numbers thus discharged during former periods, as the returns did not, until 1870, furnish the requisite information on the subject. The only test therefore available for the present is an examination of the actual numbers so discharged, and the grounds on which they were deemed unfit, which would show whether any large proportion of men have thus broken down, and if so,

whether this has been due to causes existing prior to their enlistment, or developed subsequently to, and in consequence of, their drill or duties, and in what direction a change may be necessary to avoid such results in future.

There are two modes in which this test may be applied: first, by calculating the proportion of men discharged during the first year of their service to the number of recruits who have joined during the year; or, secondly, by calculating the proportion they bear to the mean strength of the men under one year of service. The first method is liable to objection if the number joining during the year has been either much above or below that of the previous year; and the second, though applicable to regiments, is open to a source of error in depôts, the number of recruits joining them and passing on to the service companies in many instances greatly exceeding the *average* number of men under one year service borne on the strength for the year. This test would, therefore, be applicable only in the case of corps and not of depôts.

The error likely to arise in the first method of investigation may be obviated, if not entirely, at least to a very great extent, by assuming as the numbers from which the invaliding has taken place, half the number of recruits who joined during the preceding year added to half the number joining during the year under review. This would give a near approximation to the average number of the class of men under one year's service for the whole period.

The following Table shows the number of recruits who joined the different arms of the Service during the year 1870, as stated in the Returns furnished to the Secretary of State by the Commanding Officers, and the number of men who were discharged as unfit before completing their first year of service. The Table also shows the average obtained by adding half the number who joined in 1869 to half the number in 1870. Care has been taken to include the same corps in both years:—

| | No. of Recruits who joined in 1870. | No. of Men Invalided in 1870 under 1 year's service. | Average of Recruits joined in 1869 and 1870. | No. of Men Invalided in 1870 under 1 year's service | Ratio Invalided per 1,000 of average. |
|---|---|---|---|---|---|
| Household Cavalry .. | 115 | 1 | 121 | 1 | 8·26 |
| Cavalry of the Line .. | 1,313 | 15 | 965 | 15 | 15·54 |
| Royal Artillery .. | 1,406 | 26 | 1,099 | 26 | 23·65 |
| Foot Guards .. .. | 864 | 17 | 704 | 17 | 24·15 |
| Infantry Regiments .. | 10,637 | 73 | 7,295 | 73 | 10·00 |
| Depôts, Cavalry and Infantry .. .. | 4,291 | 59 | 3,480 | 59 | 16·95 |
| Depôt Brigade, R.A... | 1,691 | 14 | 1,284 | 14 | 10·90 |

This Table shows the highest proportion of discharges under one year of service to have taken place in the Foot Guards, but the alterations above alluded to did not extend to them, the recruiting for the Household Brigade being conducted by themselves and not subject to the interference of the Inspecting Field Officers of Districts or others of the Recruiting Staff. The excess cannot therefore be the result of the changes in the general system of recruiting. The Royal Artillery furnished the next highest proportion, a result which might have been anticipated from the greater amount of physical exertion required in this arm as compared with the Line. The Infantry Regiments had the lowest ratio amounting only to one per cent. of the average strength, a proportion which appears very small considering the circumstances of a large number of the recruits prior to enlistment, and the complete change in the mode of living to which they are at once subjected.

If the results of the depots be incorporated with those of the arms to which they belong, the following are the proportions discharged from each Arm:—

*United Kingdom.*

| | | | |
|---|---|---|---|
| Household Cavalry ... .... | 8·3 | per 1,000 of strength | |
| Cavalry of Line and Depôts .... | 16·4 | " | " |
| Royal Artillery and Depôt .... | 16·8 | " | " |
| Foot Guards .... ... .... | 24·1 | " | " |
| Infantry Regiments and Depôts | 12·1 | " | " |

This shows the lowest ratio of discharges during the first year of service to have been in the Household Cavalry, which however from the small numbers in it may be deemed an exceptional body. Next to it ranks the Infantry. The proportion thus discharged from the Cavalry and Artillery has been one-third higher than from the Infantry, and has been nearly identical in the two arms, while that from the Foot Guards has been double the ratio from the Infantry.

But the nature of disabilities for which the men have been discharged form an important element in the enquiry. They have therefore been taken from the Returns of the Regimental Medical Officers, and grouped in the following Table :—

| | Household Cavalry. | Cavalry of the Line and Cavalry Depôts. | Royal Artillery and Depôt Brigade. | Foot Guards. | Infantry Regiments and Depôts. |
|---|---|---|---|---|---|
| Ophthalmia.. .. .. .. | .. | 1 | 1 | .. | .. |
| Dysentery and Diarrhœa.. .. | .. | .. | .. | .. | 2 |
| Ague .. .. .. .. | .. | .. | 1 | .. | .. |
| Rheumatism .. .. .. | .. | 1 | 3 | .. | .. |
| Syphilis .. .. .. .. | .. | .. | .. | 1 | 3 |
| Tubercular Diseases .. .. | .. | 5 | 3 | 5 | 36 |
| Diseases of— | | | | | |
| Nervous System .. .. | 1 | .. | 7 | 2 | 35 |
| Circulatory „ .. .. | .. | 3 | 11 | 4 | 26 |
| Respiratory „ .. .. | .. | .. | 2 | 1 | 4 |
| Digestive „ .. .. | .. | 2 | 4 | 1 | 4 |
| Urinary „ .. .. | .. | 1 | 1 | .. | 1 |
| Reproductive „ .. .. | .. | .. | 1 | 1 | 1 |
| Locomotive „ .. .. | .. | 4 | 2 | .. | 5 |
| Integumentary „ .. .. | .. | .. | 1 | .. | 1 |
| General Debility .. .. .. | .. | 1 | .. | .. | 4 |
| Accidents, &c. .. .. .. | .. | 1 | 3 | 2 | 5 |
| Cause not stated .. .. .. | .. | .. | .. | .. | 1 |
| Total .. .. .. | 1 | 19 | 40 | 17 | 128 |

The three great classes of diseases under which the recruits have broken down, have been tubercular diseases and those of the nervous and circulatory systems. The tubercular diseases have been consumption and scrofulous affections—40 of the former and 9 of the latter. Considering the wide-spread prevalence of consumption among the general population of the country, it might naturally be expected that a considerable proportion of cases would be developed among the recruits. The lives, often of privation, which they have been living previously to enlistment and the irregularities and debauchery in which they have indulged, would naturally tend to develop these diseases in men hereditarily predisposed, and with the utmost care in the individual examination it would be impossible to avoid passing them into the service; but it is evidently in this direction that the greatest watchfulness is required.

Under diseases of the nervous system the largest proportion has been discharged on account of epilepsy. This is an affection which no amount of care in the examination can detect, unless in a very few exceptional cases, and is one also likely to be developed, if there is any tendency to it, by the

irregularities which the recruits too often commit. It must therefore always be a cause of invaliding in the early period of their service, as men, subject to fits, could not be safely trusted in many of the duties of soldiers. The only caution which seems necessary is that no man should be discharged for this cause till it has been fully verified by the personal observation of the Medical Officer.

The other great cause of invaliding among the recently enlisted soldiers has been the class of diseases of the circulatory system, and especially valve disease and hypertrophy of the heart. These diseases are likely to be developed, where there is any tendency to them, by many of the circumstances of a soldier's life; such as pack drill, severe exercise, constriction of the chest from tight clothing or accoutrements, and to be aggravated by habits of intemperance or debauchery. The much larger proportion of these cases in the Royal Artillery than in the other arms, would point to the severe exertion required in many of their duties as a probable cause of these diseases. It is extremely difficult in the short time necessarily allotted to the examination of a recruit, to make out satisfactorily the existence of a very early stage of heart disease, but to these the attention of the examiner should, from these facts, evidently be directed.

None of the other causes of disability have been so frequent as to excite any suspicion of want of care in the passing of the men into the service. Many of them most likely have arisen after enlistment; such as ophthalmia, diarrhœa, syphilis, hernia, and accidents, and in the two latter instances have, perhaps, been caused by the service.

These results have all been based on the average of recruits who joined in 1869-70.

If the other mode of enquiry, that of *calculating* the ratio discharged during the year on the average number of men in the first year of their service be adopted, the *following* results are obtained:—

| | Average No. of Men in first year of service. | No. of Men discharged in first year of service. | Ratio discharged per 1,000 serving in their first year. |
|---|---|---|---|
| Household Cavalry .. .. | 126 | 1 | 7·94 |
| Cavalry of the Line .. .. | 1,118 | 15 | 13·42 |
| Royal Artillery.. .. .. | 1,562 | 26 | 16·65 |
| Foot Guards .. .. .. | 736 | 17 | 23·10 |
| Infantry Regiments .. .. | 8,435 | 73 | 8·65 |

For reasons already explained the calculations have been made solely upon the regiments, exclusive of depôts. The average strength in each case has been obtained by adding together the number of men under one year of service on 1st January and 31st December, and dividing the total by two. This, though not perfectly accurate, gives a near approximation to the mean strength during the year.

The results fully bear out those obtained by the other mode, except in the case of the Royal Artillery in which the ratio is much lower than shown in the previous Table, but it very closely approximates that obtained from the Royal Artillery and Depôt Brigade combined. The difference between the two results probably depends on the rapid transfer of the recruits from the depot to the other brigades; the number of men under one year of service in the Brigades other than the depot, would in consequence be much greater than the number of recruits joining them directly, and would be much more nearly represented by the mean of the strength serving on the first and last day of the year than by the number of recruits. This disturbing cause does not exist in the Cavalry and Infantry Regiments which, when serving at home, have no depôt, a remark which applies also to the Household Brigade. The results obtained by the two different modes of examination approximate sufficiently to justify the deductions drawn from them with reference to the moderate amount of invaliding during the first year of the soldier's service.

# II.—ON THE HEALTH OF THE TROOPS SERVING IN THE MEDITERRANEAN.

## *Section* I.—*Sickness and Mortality.*

### I.—Gibraltar.

#### STATISTICAL REPORT.

*Gibraltar.*

The three companies of Royal Engineers in Gibraltar were relieved during the year by three from England, the 20th Company arriving in January and the 11th and 25th in May. In the beginning of March the 83rd Regiment embarked for India, being replaced by the 81st from home.

The average strength of the troops during the year was 4,397 non-commissioned officers and men; the admissions into hospital among them amounted to 2,957, and the deaths to 32, of which three occurred out of hospital and five among invalids after their arrival at Netley.

These numbers give the ratio of 672 admissions and 7·27 deaths per 1,000 of mean strength, both above the results of the preceding year.

The admissions and deaths in the different corps were as follows:—

| Corps. | Average Annual Strength. | Admitted into Hospital. | Died. | | | | Ratio per 1,000. | |
|---|---|---|---|---|---|---|---|---|
| | | | In Hospital. | Out of Hospital. | Of Invalids. | Total. | Admitted. | Died. |
| Royal Artillery .. .. .. | 726 | 555 | 5 | 1 | .. | 6 | 764 | 9·49 |
| Royal Engineers .. .. .. | 281 | 293 | 4 | .. | .. | 4 | 1,043 | 14·23 |
| 1st Battalion 13th Regiment .. | 653 | 387 | 5 | .. | .. | 5 | 593 | 7·67 |
| 28th Regiment .. .. .. | 712 | 343 | 1 | .. | .. | 1 | 482 | 1·40 |
| 71st ,, .. .. .. | 674 | 434 | 4 | .. | 1 | 5 | 644 | 7·42 |
| 74th ,, .. .. .. | 661 | 402 | 2 | 2 | 1 | 5 | 608 | 7·56 |
| 81st ,, .. .. .. | 494 | 450 | 2 | .. | 1 | 3 | 911 | 6·07 |
| 83rd ,, .. .. .. | 148 | 62 | .. | .. | 1 | 1 | 419 | 6·76 |

The other two deaths were those of a Serjeant of the Army Hospital Corps at Gibraltar and of a private of the Commissariat Staff Corps at Netley.

As in the preceding year the admissions and deaths were highest in the Royal Engineers.

The diseases by which the sickness and mortality were caused will be found detailed in Abstract No. 10 in the Appendix, from which the following summary has been framed.

| Orders. | Diseases. | 1870. Average Strength, 4,397. Admitted into Hospital. | Deaths. At Gibraltar. | Deaths. Of Invalids. | Deaths. Total. | Annual ratio per 1,000 of Strength. Admitted. | Annual ratio per 1,000 of Strength. Died. | 1869. Annual ratio per 1,000 of Strength. Admitted. | 1869. Annual ratio per 1,000 of Strength. Died. | 1869. Infantry at Home. Annual ratio per 1,000 of Strength. Admitted. | 1869. Infantry at Home. Annual ratio per 1,000 of Strength. Died. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | I. *General Diseases.* | | | | | | | | | | |
| 1 | Febrile Group .. | 442 | 4 | .. | 4 | 100·5 | ·91 | 48·3 | 1·08 | 50·1 | .44 |
| 2 | Constitutional „ .. | 512 | 8 | 3 | 11 | 116·5 | 2·50 | 134·0 | 1·51 | 148·0 | 3·28 |
| | II. *Local Diseases.* Diseases of the— | | | | | | | | | | |
| 1 | Nervous System .. | 36 | .. | .. | .. | 8·2 | .. | 9·1 | ·43 | 8·9 | ·56 |
| 2 | Eye .. .. .. | 80 | .. | .. | .. | 18·2 | .. | 25·9 | .. | 15·8 | .. |
| 3 | Ear .. .. .. | 19 | .. | .. | .. | 4·3 | .. | 2·6 | .. | 3·2 | .. |
| 4 | Nose .. .. .. | .. | .. | .. | .. | .. | .. | ·4 | .. | ·2 | .. |
| 5 | Circulatory System .. | 56 | 2 | 1 | 3 | 12·7 | ·68 | 8·0 | 1·29 | 9·3 | ·89 |
| 6 | Absorbent „ .. | 24 | .. | .. | .. | 5·5 | .. | 3·7 | .. | 10·4 | .. |
| 7 | Ductless Glands .. | .. | .. | .. | .. | .. | .. | .. | .. | ·1 | .. |
| 8 | Respiratory System .. | 187 | 4 | .. | 4 | 42·5 | ·91 | 36·3 | ·65 | 67·6 | 1·24 |
| 9 | Digestive „ .. | 399 | .. | .. | .. | 90·8 | .. | 77·5 | ·21 | 86·4 | ·38 |
| 10 | Urinary „ .. | 292 | 2 | .. | 2 | 66·4 | ·45 | 86·8 | ·21 | 105·9 | ·12 |
| 11 | Generative „ .. | 75 | .. | .. | .. | 17·1 | .. | 13·8 | .. | 9·9 | .. |
| 12 | Organs of Locomotion | 21 | .. | 1 | 1 | 4·8 | ·23 | 5·6 | .. | 3·7 | .. |
| 13 | Cellular Tissue .. | 45 | .. | .. | .. | 10·2 | .. | 11·0 | .. | 19·9 | ·03 |
| 14 | Cutaneous System .. | 364 | .. | .. | .. | 82·8 | .. | 70·6 | .. | 82·7 | .. |
| | III. *Conditions, &c.* | | | | | | | | | | |
| | Debility .. .. | 31 | .. | .. | .. | 7·0 | .. | 2·8 | .. | 3·1 | .. |
| | IV. *Poisons* .. | 40 | 2 | .. | 2 | 9·1 | ·45 | 18·5 | .. | 2·9 | .. |
| | V. *Injuries.* | | | | | | | | | | |
| 2 | Accidental .. .. | 331 | 1 | .. | 1 | 75·3 | ·23 | 70·4 | ·65 | 77·9 | ·59 |
| 3 | Homicidal .. .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | ·06 |
| 4 | Self-inflicted .. .. | 1 | 4 | .. | 4 | ·2 | ·91 | .. | .. | ·1 | ·30 |
| 5 | Judicial .. .. | .. | .. | .. | .. | .. | .. | ·2 | .. | .. | .. |
| | VI. *Surgical Operations* | 1 | .. | .. | .. | ·2 | .. | .. | .. | ·1 | .. |
| | No appreciable Disease | 1 | .. | .. | .. | ·2 | .. | ·4 | .. | ·9 | .. |
| | Total .. .. | 2,957 | 27 | 5 | 32 | 672·5 | 7·27 | 625·9 | 6·03 | 707·1 | 7·89 |
| | Average of 10 Years 1860–69 | .. | .. | .. | .. | 757·9 | 8·84 | .. | .. | .. | .. |

The admissions and deaths, though below the average of the preceding ten years, were considerably higher than in 1869, the excess of the former being chiefly in the febrile, and of the latter in the constitutional group of general diseases.

The admissions and deaths by the principal affections composing the class of GENERAL DISEASES were as follows:—

*Gibraltar.*

| General Diseases. | Admitted. | Died. | Annual ratio per 1,000. 1870. Admitted. | 1870. Died. | 1869. Admitted. | 1869. Died. |
|---|---|---|---|---|---|---|
| *Febrile—* | | | | | | |
| Eruptive Fevers .. .. .. .. .. .. | 16 | .. | 3·6 | .. | ·2 | .. |
| Continued „ .. .. .. .. .. .. .. | 372 | 4 | 84·6 | ·91 | 39·9 | ·86 |
| Paroxysmal „ .. .. .. .. .. .. .. | 47 | .. | 10·7 | .. | 7·6 | ·22 |
| Influenza .. .. .. .. .. .. .. .. | 2 | .. | ·5 | .. | .. | .. |
| Erysipelas .. .. .. .. .. .. .. .. | 5 | .. | 1·1 | .. | ·7 | .. |
| *Constitutional—* | | | | | | |
| Rheumatism .. .. .. .. .. .. .. | 200 | 1 | 45·5 | ·22 | 30·6 | .. |
| Syphilis .. .. .. .. .. .. .. .. | 260 | .. | 59·1 | .. | 91·1 | .. |
| Scrofula, Phthisis, &c. .. .. .. .. | 44 | 9 | 10·0 | 2·05 | 10·1 | 1·51 |
| Scurvy and Purpura .. .. .. .. .. | .. | .. | .. | .. | ·7 | .. |
| Anæmia .. .. .. .. .. .. .. .. | 6 | .. | 1·4 | .. | 1·9 | .. |
| Other diseases of this group .. .. .. | 2 | 1 | ·5 | ·22 | ·7 | .. |

*Eruptive Fevers* were much more prevalent than in 1869, and more than double the average of the preceding 10 years; half of the admissions were by small pox, of which all the cases were modified by previous vaccination.

*Continued Fevers* were more than twice as prevalent as in the preceding year, but without any corresponding addition to the mortality. The increase was principally in cases of *febricula*, attributed to solar heat and too free indulgence in stimulants. The Royal Engineers furnished the highest proportion of cases. *Paroxysmal Fevers* also were slightly above the average.

The attacks of fever were often followed by severe *rheumatism*, and the admissions by that disease were more numerous by one-half than in the preceding year; only one case, however, proved fatal, but 13 men were sent to England for change of climate on account of it.

There was a marked reduction in the amount of *syphilis*, the admissions having been one-third less than in 1869. The cases of infecting sore were in the proportion of one to four of the local venereal sore.

The admissions by *scrofula and phthisis* were in exactly the same proportion as in the preceding year, but the deaths were one-third higher, a fluctuation, however, which might be expected where the numbers are so small.

The death among the other diseases of the constitutional group was that of a case of *diabetes* which had been admitted into hospital in the previous year.

Local Diseases call for little remark. *Diseases of the eye* continue to show a favourable reduction and were very slightly in excess of the proportion among troops at home.

Those of the *Urinary System* were also less prevalent than in 1869, the reduction being in cases of gonorrhœa.

*Diseases of the Digestive and Cutaneous Systems* were in excess of the preceding year, the former from an increase in *tonsillitis* (sorethroat) and the latter in boils.

Poisons.—The admissions under this class were lower than in the preceding year; 16 of them with two deaths were from delirium tremens, and 24 were returned under the head of alcohol. It is presumed these were cases such as would formerly have been returned under the heading of intemperance (*ebriositas*); 15 of them were returned by the Medical Officer in charge of the Royal Artillery and five by the Royal Engineers.

*Gibraltar.*

INJURIES.—There was only one accidental death during the year, that of a gunner of the Royal Artillery who was knocked down by one of the horses at the races and had his skull fractured. There were four self-inflicted deaths, one in the Royal Artillery and three in the 74th Regiment; of the latter one was by hanging and two were by cut-throat: the Artilleryman, an officer's servant, after cutting his throat threw himself from the walls of the Moorish Castle into the street, a height of about 30 feet; the fall produced rupture of the liver, fracture of the left thigh and of one of the ribs, and several extensive contusions. He appears to have survived the infliction of these injuries about half-an-hour.

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SANITARY REPORT.

Deputy Inspector-General Bent in his Annual Sanitary Report has the following remarks:—

Amongst several minor defects in their respective barracks, the medical officers have noted none of sufficient gravity to affect the health of their occupants, except the dampness, imperfect ventilation, and, in some instances, the crowding of the King's Bastion Casemates, which the Surgeon of the 71st Highlanders reports as the probable cause of much sickness among the women and children quartered there. In this I agree with him, and have represented the necessity of reducing the number in each casemate to a maximum of 8, and the great advantage of additional accommodation for these families being provided. As far as possible the first recommendation has been carried out, and the second is, I understand, likely to be so shortly. But the delay of a twelvemonth in the transfer and adaptation of a suitable building in the Town Range for married quarters was caused by the intervention of some services considered at the time more urgent, and thus the evil which has been noticed in former Sanitary Reports still awaits its remedy.

A second important point is the completion of the new water system, by extending the supply from the sources lately discovered in the North Front to all the barracks. When this has been done all complaints of short allowance in dry seasons will be finally disposed of. There is, I believe, every prospect of all being finished, and every bath-house and latrine being in full working order within the ensuing year.

In most of the barracks there is some excess of numbers over the regulated appropriation, but, with few exceptions, the ventilation is so thorough as to admit of this being done without injury to the health of the troops. I note, however, the want of fireplaces and ventilating shafts in the Town Range Quarters occupied by the Royal Engineers; in the lower tier of the Casemate Barracks, where the 13th Regiment is quartered, and in the upper storeys of the South Barracks held by the 28th Regiment.

Of the remaining improvements required, I may mention roof ventilation in the quarters of the Schoolmaster and Musketry Serjeant in the Casemate Square. Baths and increased ablution conveniences in the Wellington Front Barracks, and reconstruction of the latrines at Windmill Hill—these last being old and often offensive.

The sanitary services executed during the past year have been numerous.

The Surgeon-Major, Royal Artillery, strongly recommends that a broader-brimmed summer cap be substituted for that now in use; and the Surgeon, Royal Engineers, that a serge or light woollen working dress should replace the present white duck trousers and jumper, also that a well-lined straw hat should be worn on the works; in all of which recommendations I fully concur.

The hospital accommodation and arrangements are all that can be desired, with the exception of the additional water supply needed for the baths and latrines, and not yet laid on from the waterworks.

In connection with this establishment, however, a proposal for the construction of a convalescent hospital for a small number of convalescents is under the consideration of the Authorities, and I am of opinion that, if this can

*Gibraltar.* be effected, the number of invalids annually sent to England for change may be materially diminished.

With reference to the prevalence of venereal disease, I may state that there is a local ordinance for the inspection of alien prostitutes, and also a Lock Hospital for their treatment, but as natives are not compulsorily subjected to inspection its operation is of course imperfect, though decidedly effective.

No special provision exists at any of the barracks for the nightly private ablution of the men.

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## II.—Malta.

### STATISTICAL REPORT.

*Malta.* In January the 26th Company of Royal Engineers from England relieved the 27th, and in June the 17th Company from Gibraltar replaced the 53rd which had left the island for England in April. With these exceptions there was no change in the troops composing the garrison.

The average strength of the troops, exclusive of the Royal Malta Fencible Artillery, was 4,799, the admissions into hospital among them amounted during the year to 3,165 and the deaths to 48, of which 6 occurred out of hospital and 8 among the invalids sent to England. These numbers give the proportion of 659 admissions and 10·00 deaths per 1,000 of mean strength, being a mere fraction higher than the ratios in the preceding year, but considerably under the average of the last 10 years.

The following Table shows the sickness and mortality in each of the corps composing the garrison :—

| Corps. | Average Annual Strength. | Admitted into Hospital. | Died. | | | | Ratio per 1,000 of Strength. | |
|---|---|---|---|---|---|---|---|---|
| | | | In Hospital. | Out of Hospital. | Of Invalids. | Total. | Admitted. | Died. |
| Royal Artillery .. .. .. .. | 719 | 460 | 5 | 1 | 3 | 9 | 640 | 12·52 |
| Royal Engineers .. .. .. .. | 164 | 201 | 1 | .. | .. | 1 | 1,226 | 6·10 |
| 1st Battalion 24th Regiment .. | 625 | 349 | 2 | 2 | .. | 2 | 558 | 3·20 |
| 31st Regiment .. .. .. .. | 668 | 293 | 7 | 1 | 3 | 11 | 439 | 16·47 |
| 48th ,, .. .. .. .. | 689 | 542 | 5 | 2 | .. | 7 | 787 | 10·16 |
| 52nd ,, .. .. .. .. | 674 | 637 | 5 | .. | 1 | 6 | 945 | 8·90 |
| 64th ,, .. .. .. .. | 602 | 295 | 6 | .. | 1 | 7 | 490 | 11·63 |
| 87th ,, .. .. .. .. | 614 | 367 | 3 | .. | .. | 3 | 598 | 4·89 |

The Royal Engineers had the highest proportion of admissions, and the 31st Regiment of deaths.

The following Table framed from Abstract No. 10 in the Appendix, shows the influence of the different classes of diseases in causing the sickness and mortality :—

| Orders. | Diseases. | 1870.—Average Strength, 4,799. | | | | | | 1869. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Admitted into Hospital. | Deaths. | | | Annual ratio per 1,000 of Strength. | | Annual ratio per 1,0 0 of Strength. | |
| | | | In Malta. | Of Invalids. | Total. | Admitted. | Died. | Admitted. | Died. |
| | I. *General Diseases.* | | | | | | | | |
| 1 | Febrile .. .. | 650 | 7 | .. | 7 | 135·5 | 1·46 | 192·4 | ·79 |
| 2 | Constitutional .. .. | 372 | 5 | 4 | 9 | 77·5 | 1·87 | 51·3 | 1·00 |
| | II. *Local Diseases.* | | | | | | | | |
| | Diseases of the— | | | | | | | | |
| 1 | Nervous System .. | 42 | 2 | 2 | 4 | 8·7 | ·84 | 9·1 | 1·00 |
| 2 | Eye .. .. .. | 102 | .. | .. | .. | 21·3 | .. | 26·0 | .. |
| 3 | Ear .. .. .. | 10 | .. | .. | .. | 2·1 | .. | 2 0 | .. |
| 4 | Nose .. .. .. | 3 | .. | .. | .. | ·6 | .. | ·2 | .. |
| 5 | Circulatory System .. | 39 | 6 | 2 | 8 | 8·1 | 1·67 | 10·1 | 1·39 |
| 6 | Absorbent „ .. | 16 | .. | .. | .. | 3·3 | .. | 4·0 | .. |
| 8 | Respiratory „ .. | 202 | 2 | .. | 2 | 42·1 | ·42 | 33 6 | 1·19 |
| 9 | Digestive „ .. | 516 | 9 | .. | 9 | 107·5 | 1·87 | 97·5 | 1·19 |
| 10 | Urinary „ .. | 157 | 2 | .. | 2 | 32·7 | ·42 | 25·5 | .. |
| 11 | Generative „ .. | 71 | .. | .. | .. | 14·8 | .. | 11 3 | .. |
| 12 | Organs of Locomotion.. | 20 | .. | .. | .. | 4·2 | .. | 5·4 | .. |
| 13 | Cellular Tissue.. .. | 135 | .. | .. | .. | 28·1 | .. | 25·9 | .. |
| 14 | Cutaneous System .. | 296 | .. | .. | .. | 61·7 | .. | 61·3 | .. |
| | III. *Conditions, &c.* | | | | | | | | |
| | Debility.. .. .. | 26 | .. | .. | .. | 5·4 | .. | 4·4 | .. |
| | IV. *Poiscns* .. | 31 | 1 | .. | 1 | 6·5 | ·21 | 7·7 | 1·00 |
| | V. *Injuries.* | | | | | | | | |
| 2 | Accidental .. .. | 460 | 3 | .. | 3 | 95·9 | ·62 | 83·9 | 1·00 |
| 3 | Homicidal .. .. | 2 | .. | .. | .. | ·4 | .. | .. | .. |
| 4 | Self-inflicted .. .. | 2 | 3 | .. | 3 | ·4 | ·62 | 1·2 | 1·00 |
| | VI. *Surgical Operations* | 1 | .. | .. | .. | ·2 | .. | ·4 | ·19 |
| | No appreciable disease.. | 12 | .. | .. | .. | 2·5 | .. | 2·0 | .. |
| | Total .. .. | 3,165 | 40 | 8 | 48 | 659·5 | 10·00 | 655·2 | 9·75 |
| | Average of 10 Years, 1860–69 .. .. | .. | .. | .. | .. | 829·9 | 13·48 | .. | .. |

GENERAL DISEASES.—There has been a considerable decrease in the febrile, but an increase in the constitutional group of this class. The admissions and deaths by the principal diseases composing it were as follows :—

*Malta.*

| General Diseases. | 1870. | | Annual Ratio per 1000 of Strength. | | | |
|---|---|---|---|---|---|---|
| | | | 1870. | | 1869. | |
| | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| *Febrile—* | | | | | | |
| Eruptive Fevers .. .. .. .. | 1 | .. | ·2 | .. | ·6 | .. |
| Continued „ .. .. .. .. | 633 | 6 | 131·9 | 1·25 | 179·8 | ·60 |
| Paroxysmal „ .. .. .. .. | 9 | 1 | 1·9 | ·21 | 9·7 | ·20 |
| Influenza .. .. .. .. .. .. | 3 | .. | ·6 | .. | .. | .. |
| Erysipelas .. .. .. .. .. .. | 4 | .. | ·8 | .. | 1·6 | .. |
| Other diseases of this group .. .. | .. | .. | .. | .. | ·6 | .. |
| *Constitutional—* | | | | | | |
| Rheumatism .. .. .. .. .. | 283 | .. | 59·0 | .. | 32·4 | .. |
| Syphilis .. .. .. .. .. .. | 38 | .. | 7·9 | .. | 9·7 | .. |
| Scrofula, Phthisis, &c. .. .. .. | 41 | 8 | 8·5 | 1·67 | 7·9 | ·60 |
| Scurvy and Purpura .. .. .. .. | .. | .. | .. | .. | ·4 | .. |
| Anæmia .. .. .. .. .. .. | 8 | .. | 1·7 | .. | .. | .. |
| Other diseases of this group .. .. | 2 | 1 | ·4 | ·21 | ·8 | ·20 |

*Continued Fevers* were much less prevalent than in the preceding year but with a higher rate of mortality. The exemption was attributed by the Principal Medical Officer to the suspension during the summer months of all fatigues, drills, and working parties which were not absolutely necessary, to the precaution of relieving the barrack rooms in the hot and oppressive weather by causing a proportion of the men to sleep under canvas, and to the summer of 1870 not having been very oppressive.

*Rheumatism* furnished a much higher proportion of admissions than in 1869, and also considerably above the average of the ten preceding years. The 48th and 52nd Regiments had the greatest numbers; the Medical Officers of thes corps state that in a large majority of the cases the disease followed an attack of continued fever.

*Syphilis* continued to show a decrease in the admissions which amounted only to eight per 1,000 of the strength.

The ratio of deaths by *Scrofula and Consumption* though much higher than in 1869 were still under the average of the preceding 10 years.

*Local Diseases.*—The prevalence of the various orders composing this class did not differ materially from the preceding year. There was a slight decrease in ophthalmia, and increase in the diseases of the respiratory, digestive, and urinary systems in the last of these due to gonorrhœa.

*Injuries.*—In this class there were three accidental and three suicidal deaths. Of the accidental, two were caused by fracture of skull from falls, and one by drowning. Of the suicidal, one was by gunshot, one by drowning, and one by multiple injury caused by the man throwing himself from a window about 40 feet from the ground, the results of the fall were concussion of the brain, fracture of the pelvis, and effusion of a large quantity of blood into the abdomen.

Two cases of homicidal wounds were returned by the Surgeon of the 64th Regiment, but as he makes no reference to them in his Report, it is presumed they were of no importance.

## Royal Malta Fencible Artillery.

The average strength of the corps in 1870 was 568 non-commissioned officers and men, among whom 474 admissions into hospital and two deaths occurred, being respectively in the ratio of 834 and 3·52 per 1,000 of the

strength, the former somewhat higher and the latter lower than in the preceding year. *Malta.*

The influence of the different classes of diseases in producing sickness and mortality is shown in the following table framed from Abstract No. 10 in the Appendix.

| Orders. | Diseases. | Average Strength. | Royal Malta Fencible Artillery. | | | | | | Annual Ratio per 1,000 of Strength. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 568 | | Annual Ratio per 1,000. | | | | Line Regiments at Malta. 1870. | |
| | | | | | 1870. | | 1869. | | | |
| | | | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| | I. *General Diseases.* | | | | | | | | | |
| 1 | Febrile Group .. .. | | 21 | 1 | 37·0 | 1·76 | 67·7 | .. | 135·5 | 1·46 |
| 2 | Constitutional „ .. .. | | 46 | .. | 81·0 | .. | 69·5 | 1·83 | 77·5 | 1·87 |
| | II. *Local Diseases.* | | | | | | | | | |
| | Diseases of the— | | | | | | | | | |
| 1 | Nervous System .. .. | | 10 | .. | 17·6 | .. | 7·3 | 1·83 | 8·7 | ·84 |
| 2 | Eye .. .. .. .. | | 82 | .. | 144·4 | .. | 82·3 | .. | 21·3 | .. |
| 3 | Ear .. .. .. .. | | 1 | .. | 1·7 | .. | 1·8 | .. | 2·1 | .. |
| 4 | Nose .. .. .. .. | | 1 | .. | 1·7 | .. | .. | .. | ·6 | .. |
| 5 | Circulatory System .. .. | | 2 | .. | 3·5 | .. | 9·2 | .. | 8·1 | 1·67 |
| 6 | Absorbent „ .. .. | | 1 | | 1·7 | .. | .. | .. | 3·3 | .. |
| 8 | Respiratory „ .. .. | | 44 | .. | 77·5 | .. | 73·1 | .. | 42·1 | ·42 |
| 9 | Digestive „ .. .. | | 107 | 1 | 188·4 | 1·76 | 184·7 | 1·83 | 107·5 | 1·87 |
| 10 | Urinary „ .. .. | | 27 | .. | 47·5 | .. | 47·5 | .. | 32·7 | ·42 |
| 11 | Generative „ .. .. | | 5 | .. | 8·8 | .. | 1·8 | .. | 14·8 | .. |
| 12 | Organs of Locomotion .. | | 2 | .. | 3·5 | .. | 7·3 | .. | 4·2 | .. |
| 13 | Cellular Tissue .. .. | | 20 | .. | 35·2 | .. | 38·4 | .. | 28·1 | .. |
| 14 | Cutaneous System .. .. | | 67 | .. | 118·0 | .. | 144·4 | .. | 61·7 | .. |
| | III. *Conditions, &c.* | | | | | | | | | |
| | Debility .. .. .. | | 3 | .. | 5·3 | .. | .. | .. | 5·4 | .. |
| | IV. *Poisons* .. .. | | 2 | .. | 3·5 | .. | .. | .. | 6·5 | ·21 |
| | V. *Injuries.* | | | | | | | | | |
| 2 | Accidental .. .. .. | | 33 | .. | 58·1 | .. | 60·3 | .. | 95·9 | ·62 |
| 3 | Homicidal .. .. .. | | .. | .. | .. | .. | .. | .. | ·4 | .. |
| 4 | Self-inflicted .. .. .. | | .. | .. | .. | .. | 1·8 | .. | ·4 | ·62 |
| | VI. *Surgical Operations* .. | | .. | .. | .. | .. | .. | .. | ·2 | .. |
| | No appreciable disease .. | | .. | .. | .. | .. | 1·8 | .. | 2·5 | .. |
| | Total .. .. | | 474 | 2 | 834·4 | 3·52 | 798·9 | 5·49 | 659·5 | 10·00 |
| | Average of 10 years 1860–69. | | .. | .. | 839·3 | 8·48 | | | | |

The admissions were somewhat higher than in 1869, but very closely approximated the average of the preceding ten years; the ratio of mortality was very low.

*Malta.*

GENERAL DISEASES.—The admissions by the febrile group were, as in the Line regiments, considerably lower, and by the constitutional group considerably higher than in 1869; the decrease in the former was chiefly in cases of *febricula* and the increase in the latter in rheumatism.

LOCAL DISEASES.—There was a very marked increase in *diseases of the eye* owing to the prevalence of ophthalmia during the latter half of the year. It was attributed by the Medical Officers to atmospheric changes, and is stated to have been very prevalent among the civil population; it does not appear to have extended to the other troops. There was a decrease in the prevalence of diseases of the cutaneous system, chiefly ulcers and boils. The other diseases do not call for special remark.

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SANITARY REPORT.

Inspector-General Paynter, C.B., reports:—

1. I am disposed to consider that drinking to excess has been a fertile cause of disease and mortality. I am so firmly convinced of its being a very common cause of disease, that I attribute the great majority of admissions into hospital, either directly or indirectly, to intemperance.

During the year 1870, 198 admissions into hospital took place from among the troops in this command directly caused by excessive drinking, being 20 in excess of those in 1869; and when we take into consideration the number of attacks which doubtless are directly or remotely caused by intemperance, including all the bruises, sprains, and other trivial accidents which are constantly occurring, it is quite certain that more than half the admissions into hospital are consequent on this failing.

2. The following are the causes of the diseases referred to in the different regimental reports, viz.: Badly constructed and ill ventilated barrack rooms, almost universally insufficiently lighted; dampness of rooms in winter, without means of warming and drying them; insufficient water for flushing purposes; badly constructed latrines and urinals, with very defective drainage and sewerage; insufficient lavatory and bath accommodation; insufficient means of cooking the meals in a satisfactory manner. The sites on which barracks are built and the insanitary condition of the vicinities of barracks are prejudicial to health. Guard-rooms, cells, and lock-up rooms in several instances are stated to be too small, with insufficient light and ventilation; and several of the Medical Officers state that the canteens attached to some of the barracks are small, dark, damp, and insufficiently ventilated.

3. The most important sanitary improvements which demand attention are—the securing an abundant supply of pure water for drinking and cooking purposes, as well as a plentiful supply for flushing latrines, urinals, and sewers, as also a sufficient quantity for the supply of the lavatories and baths. Each barrack room should be supplied with filters sufficient for insuring filtered water for all its occupants. The barrack accommodation demands serious consideration. Nearly all the barrack rooms in the command are ill constructed, dark, and almost universally ill ventilated.

4 Every barrack room should have a fireplace with an allowance of fuel granted during the winter months, in order to keep it free from damp and assist in ventilating it. Night urinals, as a substitute for "urine tubs," would add much to the sanitary condition of barrack rooms. In some barracks, such as Fort Manoel, for instance, quarters for married soldiers are urgently required. Wooden huts should not be used as dwellings: they are too hot in summer, and too cold and damp in winter. Many of the guard-rooms, cells, and lock-up rooms require attention as regards size, light, and ventilation. Properly constructed latrines and urinals, with continuous flushing pipes fixed to the latter, are required in many of the barracks, with sewers, &c., leading from them. Improvement in the kitchens is required in many of the barracks, as well as proper ablution and bath rooms. Each soldier should wear a flannel waistcoat and a pair of "drawers" next his skin all the year round. At present it is optional with the soldier whether he wears a flannel

or a cotton shirt. All fatigues, drills, and working parties, not absolutely necessary, should cease from June 1st to October 31st of each year, or as long as the weather continues hot and oppressive, and half the men of all regiments, excepting those occupying "St. Francis" Barrack, "St. James' Cavalier," and Pembroke Camp, should sleep in tents during the same periods. Such arrangements must, of course, always depend on peculiarity of seasons.

Satisfactory hospital accommodation for the sick in this command is a most prominent requirement. There ought to be not only good hospital accommodation for the soldier, with wards separated from the main buildings for contagious affections, &c., but, in a large command like this, hospitals should be erected for officers, as also others for women and children.

The year 1870 has been a healthy one, and, in so far as the admissions into hospital with attacks of fever are concerned, a more healthy year than 1869; but the deaths consequent on these attacks were rather higher than during the year 1869.

I believe that the satisfactory state of health which has obtained among the troops in the command during these two years has resulted, in a very great measure, from the orders which were given by His Excellency the General Commanding that all fatigues, drills, and working parties, save those absolutely necessary, should cease during the hot season, and, more especially, from his order that troops occupying certain barracks should sleep under canvas during the same hot and oppressive time. I am not aware that these sanitary arrangements were ever carried out so generally, prior to the years 1869 and 1870 (they were partially carried out about the middle and end of the hot season of 1868, and in consequence of the immediate benefit to health which took place, the arrangements were ordered to be made earlier and more general in the years 1869 and 1870). I strongly recommend that in future years they may be continued.

The other leading and more prominent sanitary improvements which have been effected since the end of 1869 are the following:—

*At "Marsamuscetto" Barrack.*—A new latrine and urinals are nearly completed. A new lavatory and bath room are also nearly completed.

*At St. James' Cavalier.*—A new kitchen is nearly completed.

*At St. Peter's Lower Counterguard Barrack (also named "Fort Lascaris").*—Rooms 11 to 17 have been well lighted and ventilated by means of additional windows.

*At "St. Salvatore" Barrack.*—A bath has been erected.

*At "Verdala" Barrack.*—Several of the rooms have been much improved by having openings made in each with iron "shutters" adapted to them, which can be opened and closed when considered necessary.

*At "Isola Gate" Barrack.*—The rooms have been much improved both as regards light and ventilation. Additional means of cooking are being erected in the kitchen.

*At "Polverista Gate" Barrack.*—Additional means of cooking have been erected in the kitchen.

*At "Burmola Curtain."*—Quarters for married families have been much improved by the removal of cooking stoves from the passages.

*At "Fort Manoel,"* new latrines and urinals have been erected.

*At "Pembroke Camp,"* the drainage and sewerage have been completed. New latrines and urinals have been erected. More latrine accommodation for officers is nearly completed.

Lavatory and bath accommodation have been completed.

As regards the prevalence of venereal disease, there is a local ordinance in force for its prevention, viz.: Ordinance No. 4 of 1861—"An Ordinance "enacted by the Governor of Malta with the advice and consent of the "Council of Government thereof, for the prevention of the spreading of "venereal diseases."

The admissions consequent on venereal affections, have been rather more numerous than in 1869, but too few to require special notice.

*Section* II.

***On the Extent of Invaliding among the Troops serving in the Mediterranean.***

*Malta.* There were 166 invalids from Gibraltar sent home and 110 discharged at Netley, and there were 172 sent from Malta and 117 discharged, making a total of 338 sent to England and 227 finally discharged the Service, being in the ratio of 36·7 and 24·7 per 1,000 of the mean strength of troops serving in the Mediterranean.

The disabilities of the invalids are stated in detail in Abstract No. 10 in the Appendix, from which the following classified summary has been framed:—

| | Invalids sent home from | | | Invalids discharged at Netley from | | |
|---|---|---|---|---|---|---|
| | Gibraltar. | Malta. | Total. | Gibraltar. | Malta. | Total. |
| Continued Fevers .. .. .. | 4 | 2 | 6 | .. | .. | .. |
| Paroxysmal Fevers .. .. .. | 3 | .. | 3 | 1 | .. | 1 |
| Rheumatism .. .. .. .. | 13 | 15 | 28 | 9 | 6 | 15 |
| Syphilis .. .. .. .. .. | 13 | 6 | 19 | 4 | 4 | 8 |
| Scrofula, Phthisis, and Hæmoptysis .. | 24 | 26 | 50 | 31 | 27 | 58 |
| Other general diseases .. .. .. | 6 | 7 | 13 | 3 | 8 | 11 |
| Diseases of the— | | | | | | |
| Nervous System .. .. .. | 8 | 21 | 29 | 3 | 7 | 10 |
| Eye and Ear .. .. .. .. | 12 | 9 | 21 | 9 | 6 | 15 |
| Circulatory System .. .. .. | 27 | 24 | 51 | 27 | 22 | 49 |
| Absorbent „ .. .. .. | .. | 2 | 2 | .. | 1 | 1 |
| Respiratory „ .. .. .. | 14 | 10 | 24 | 4 | 7 | 11 |
| Digestive „ .. .. .. | 11 | 16 | 27 | 6 | 12 | 18 |
| Urinary „ .. .. .. | 4 | 4 | 8 | 3 | .. | 3 |
| Generative „ .. .. .. | .. | 2 | 2 | .. | 1 | 1 |
| Organs of Locomotion .. .. | 5 | 4 | 9 | 1 | 5 | 6 |
| Cellular Tissue .. .. .. | .. | 1 | 1 | .. | .. | .. |
| Cutaneous System .. .. .. | 7 | 9 | 16 | 3 | 3 | 6 |
| Debility .. .. .. .. .. | 12 | 10 | 22 | 3 | 4 | 7 |
| Accidental injuries .. .. .. | 3 | 4 | 7 | 2 | 4 | 6 |
| Surgical operations .. .. .. | .. | .. | .. | 1 | .. | 1 |
| Total .. .. .. | 166 | 172 | 338 | 110 | 117 | 227 |
| Ratio per 1,000 of Mean Strength { 1870 .. .. | 37·7 | 35·8 | 36·7 | 25·0 | 24·4 | 24·7 |
| Ratio per 1,000 of Mean Strength { 1860-69 .. .. | 26·6 | 19·8 | 23·0 | 19·4 | 14·7 | 16·9 |

The proportion of invalids sent home and discharged was considerably above the average of the last ten years, and was also higher than in 1869. Scrofula and phthisis and diseases of the circulatory system were the most frequent causes of disability. Rheumatism and diseases of the nervous and digestive systems were also frequent causes of invalids being sent to England, but furnished a much smaller proportion of men finally discharged the Service.

*Section* III.

*Mean Daily Sick.*

*Malta.*

The number of men constantly non-effective from sickness during the year was 138 at Gibraltar and 157 at Malta, exclusive of the Royal Malta Fencibles, being respectively in the ratio of 31·39 and 32 72 per 1,000 of mean strength. The following Table gives the usual calculations in connection with this subject:—

| | Gibraltar. | Malta, exclusive of Royal Malta Fencibles. | United Kingdom. Infantry Regiments. Average of ten years, 1860–69. |
|---|---|---|---|
| Average Strength in 1870 .. | 4,397 | 4,799 | |
| Average constantly sick .. .. | 138 | 157 | |
| Ratio per 1,000 constantly sick { 1870 .. | 31·39 | 32·72 | ... |
| Ratio per 1,000 constantly sick { 1860–69.. | 38·29 | 44·66 | 42·24 |
| | days | days | days |
| Average sick time to each Soldier { 1870 .. | 11·46 | 11·94 | .. |
| Average sick time to each Soldier { 1860–69.. | 13·98 | 16·30 | 15·42 |
| Average duration of the cases { 1870 .. | 17·03 | 18·11 | .. |
| Average duration of the cases { 1860–69.. | 18·44 | 19·64 | 19·11 |

Compared with the results for 1869 there has been a slight increase in the proportion constantly sick and the average sick time to each soldier, but a decrease in the duration of the cases at Gibraltar, and there has been a marked decrease in all these particulars at Malta. The results in the two Commands closely approximate, but are slightly in favour of the troops at Gibraltar.

*Section* IV.

*On the Influence of Age on the Mortality.*

The following Table, framed from Abstract No. 11 in the Appendix, shows the strength and deaths at different ages in quinquennial periods in 1870, compared with the average of the ten preceding years.

| | Ratio of deaths per 1,000 of strength at each period of life. | | | | | |
|---|---|---|---|---|---|---|
| | Under 20. | 20 and under 25. | 25 and under 30. | 30 and under 35. | 35 and under 40. | 40 and upwards. |
| Mediterranean Commands.. { 1870 .. | 1·30 | 4·17 | 9·25 | 11·99 | 20·08 | 43·48 |
| Mediterranean Commands.. { 1860–69 | 4·21 | 6·54 | 11·99 | 13·89 | 25·56 | 28·71 |

# III.—ON THE HEALTH OF THE TROOPS SERVING IN THE DOMINION OF CANADA.

## *Section* I.

## *Sickness and Mortality.*

### STATISTICAL REPORT.

*Dominion of Canada.*

During the year extensive reductions took place in the Force employed in this Command. In the end of January, the 1st Battalion 16th Regiment embarked for England, being relieved by the 84th from Jamaica. In June, a Battery of the 4th Brigade R.A. left for England, and the Royal Canadian Rifle Regiment was disbanded; in July, two Batteries R.A. and two Companies R.E. returned home, and in the end of August, the 1st Battalion Rifle Brigade followed. In the middle of July, a Company of Royal Engineers arrived from Bermuda. In November, four Batteries R.A., one Company R.E., and the 69th Regiment, left the Command for Bermuda and the West Indies, and on the last day of the year the 84th Regiment embarked for England, having been relieved by the 61st from Bermuda.

The average strength of the troops in the Command, exclusive of those employed in the Red River Expedition, was 4,519; the admissions into hospital were 2,971, and the deaths 39, including three among the invalids sent home for discharge. These numbers give the proportion of 657 admissions and 8·63 deaths per 1,000 of mean strength, the former being higher and the latter nearly identical with the ratios of the preceding year.

The following Table shows the amount of sickness and mortality in each corps:—

| | Average Annual Strength. | Admitted into Hospital. | Deaths. | | | | Annual ratio per 1,000. | |
|---|---|---|---|---|---|---|---|---|
| | | | In Hospital. | Out of Hospital. | Of Invalids. | Total. | Admitted. | Died. |
| Royal Artillery .. | 804 | 516 | 6 | 5 | 2 | 13 | 641·8 | 16·17 |
| Royal Engineers .. | 263 | 223 | .. | 1 | .. | 1 | 847·9 | 3·80 |
| 1st Bn. 60th Foot .. | 552 | 293 | 3 | 3 | .. | 6 | 530·8 | 10·87 |
| 69th Foot .. .. | 629 | 586 | 2 | 2 | .. | 4 | 931·6 | 6·36 |
| 78th „ .. .. | 663 | 511 | 2 | .. | .. | 2 | 770·7 | 3·02 |
| 84th „ .. .. | 650 | 414 | 2 | 1 | .. | 3 | 636·9 | 4·60 |
| 1st Bn. Rifle Brigade | 417 | 221 | .. | 1 | .. | 1 | 530·0 | 2·40 |
| Royal Canadian Rifles | 314 | 157 | 6 | 2 | .. | 8 | 500·0 | 25·48 |

The other death was that of an invalid of the 1st Battalion 16th Regiment, at Netley. The 16th and 61st Regiments were in the Command for so short a

portion of the year that it has not been considered necessary to include them in this Table. *Dominion of Canada.*

The following classified summary of Abstract No. 12 in the Appendix, shows the influence of the different classes of diseases in causing sickness and mortality in this command :—

| Orders. | Diseases. | Strength, 4,519. Admissions. | Deaths. In Dominion of Canada. | Deaths. Of Invalids. | Deaths. Total. | 1870. Annual Ratio per 1,000. Admissions. | 1870. Annual Ratio per 1,000. Deaths. | 1869. Annual Ratio per 1,000. Admissions. | 1869. Annual Ratio per 1,000. Deaths. |
|---|---|---|---|---|---|---|---|---|---|
| | I. *General Diseases.* | | | | | | | | |
| 1 | Febrile Group .. | 169 | 1 | .. | 1 | 37·4 | ·22 | 41·0 | ·65 |
| 2 | Constitutional „ .. | 526 | 6 | 2 | 8 | 116·4 | 1·77 | 115·0 | 1·31 |
| | II. *Local Diseases.* | | | | | | | | |
| | Diseases of the— | | | | | | | | |
| 1 | Nervous system .. .. | 43 | 4 | .. | 4 | 9·5 | ·89 | 8·9 | ·98 |
| 2 | Eye .. .. .. | 89 | .. | .. | .. | 19·7 | .. | 12·9 | .. |
| 3 | Ear .. .. .. | 10 | .. | .. | .. | 2·2 | .. | 2·8 | .. |
| 4 | Nose .. .. .. | 3 | .. | .. | .. | ·7 | .. | ·4 | .. |
| 5 | Circulatory system .. | 22 | 5 | .. | 5 | 4·9 | 1·11 | 6·4 | 1·75 |
| 6 | Absorbent „ .. | 106 | .. | .. | .. | 23·5 | .. | 14·0 | .. |
| 7 | Ductless Glands.. .. | .. | .. | .. | .. | .. | .. | ·1 | .. |
| 8 | Respiratory system .. | 269 | 4 | 1 | 5 | 59·5 | 1·11 | 72·5 | 1·53 |
| 9 | Digestive „ .. | 393 | 3 | .. | 3 | 87·0 | ·66 | 61·4 | ·33 |
| 10 | Urinary „ .. | 414 | .. | .. | .. | 91·6 | .. | 84·3 | ·55 |
| 11 | Generative „ .. | 40 | .. | .. | .. | 8·8 | .. | 11·4 | .. |
| 12 | Organs of Locomotion .. | 18 | .. | .. | .. | 4·0 | .. | 3·7 | ·11 |
| 13 | Cellular Tissue .. .. | 91 | .. | .. | .. | 20·1 | .. | 21·4 | ·11 |
| 14 | Cutaneous system .. | 247 | .. | .. | .. | 54·6 | .. | 46·3 | .. |
| | III. *Conditions, &c.* | | | | | | | | |
| | Debility .. .. .. | 13 | .. | .. | .. | 2·9 | .. | 2·5 | .. |
| | IV. *Poisons* .. | 63 | 2 | .. | 2 | 13·9 | ·44 | 9·1 | ·22 |
| | V. *Injuries.* | | | | | | | | |
| 2 | Accidental .. .. | 445 | 7 | .. | 7 | 98·5 | 1·54 | 72·1 | ·65 |
| 3 | Homicidal .. .. | 1 | .. | .. | .. | ·2 | .. | .. | ·11 |
| 4 | Self-inflicted .. .. | 1 | 4 | .. | 4 | ·2 | ·89 | ·2 | ·44 |
| | VI. *Surgical Operations* | .. | .. | .. | .. | .. | .. | ·4 | .. |
| | No appreciable disease .. | 8 | .. | .. | .. | 1·8 | .. | ·7 | .. |
| | Total .. .. | 2,971 | 36 | 3 | 39 | 657·4 | 8·63 | 587·5 | 8·74 |
| | Average of 10 years, 1860-69.. .. | .. | .. | .. | .. | 644·7 | 9·32 | .. | .. |

The admissions were very slightly above and the deaths ·69 below the average of the preceding ten years.

General Diseases differed very little from the preceding year. The admissions and deaths by the principal diseases composing this class were as follows :—

*Dominion of Canada.*

| Diseases. | Admitted. | Died. | Ratio per 1,000 of Strength. 1870. Admitted. | 1870. Died. | 1869. Admitted. | 1869. Died. |
|---|---|---|---|---|---|---|
| *Febrile—* | | | | | | |
| Eruptive Fevers .. .. .. | 6 | .. | 1·3 | .. | 2·9 | ·11 |
| Continued „ .. .. .. | 98 | .. | 21·7 | .. | 19·5 | ·44 |
| Paroxysmal „ .. .. .. | 25 | .. | 5·5 | .. | 6·8 | .. |
| Influenza .. .. .. .. | 27 | .. | 6·0 | .. | 5·9 | .. |
| Erysipelas .. .. .. .. | 11 | 1 | 2·4 | ·22 | 5·6 | .. |
| Other Diseases of this group .. .. | 2 | .. | ·4 | .. | ·3 | ·11 |
| *Constitutional—* | | | | | | |
| Rheumatism .. .. .. .. | 143 | .. | 31·6 | .. | 35·0 | .. |
| Syphilis .. .. .. .. .. | 336 | .. | 74·4 | .. | 72·4 | .. |
| Scrofula, Phthisis, &c. .. .. .. | 33 | 7 | 7·3 | 1·55 | 5·6 | 1·09 |
| Scurvy and Purpura .. .. .. | 6 | .. | 1·3 | .. | ·6 | .. |
| Anæmia .. .. .. .. | .. | .. | .. | .. | ·7 | .. |
| Other Diseases of this group .. .. | 8 | 1 | 1·8 | ·22 | ·8 | ·11 |

The results so closely approximate those of the preceding year as scarcely to require special remark. Syphilis still holds a prominent place having been the cause of nearly half the admissions by this class. There were 247 admissions for primary venereal sores and 89 for secondary syphilis. The 69th Regiment at Quebec had much the largest proportion of cases, there having been 93 of primary syphilis in ten months and a half, or in the annual ratio of 148 per 1,000 of mean strength.

Local Diseases.—Those of the eye were more prevalent than in 1869, but cannot be said to have been epidemic in any of the corps. The 84th had the greatest number of admissions, but in it they only amounted to 21. There was also an increase in the diseases of the digestive system, chiefly in cases of dyspepsia, and most probably the result of intemperance.

Injuries furnished a much higher proportion of admissions and deaths than in 1869; the former were not confined to any class of injuries, the latter were chiefly by drowning; the deaths by suicide were exactly the same in number as in the preceding year, but occurred in a Force of only half the amount; two were by cut throat, one by gunshot, and one by drowning.

### *The Red River Expedition.*

In the end of May, a Force composed of Regular Troops and Militia was despatched from Canada to Fort Garry in the Red River Settlement. It consisted of a detachment of 19 men of the Royal Artillery and 19 of the Royal Engineers, 7 Companies of the 1st Battalion 60th Foot, 335 strong, and 2 Militia Regiments—the 1st Ontario Rifles, 362, and the 2nd Quebec Rifles, 348 strong. The Force assembled at Thunder Bay, on Lake Superior, in the end of May, proceeded across the country to Fort Garry on the Red River, a distance of about 663 miles by the route taken. After a rest of five days, the Regulars and such portion of the Militia as was not to remain in the territory commenced their return march, and reached Montreal in the beginning of October without a single death having occurred in the Force. During the four months the troops were employed on this expedition there were 36 cases admitted into hospital from the Regulars and 90 from the Militia, being respectively in the *annual* ratio of 263 and 375 per 1,000 of the strength. Rheumatism was the disease which caused the greatest number of admissions.

*Dominion of Canada.*

The average number constantly non-effective from sickness amounted only to about 6 per 1,000 of the Regulars and 9½ per 1,000 of the Militia, a remarkably low proportion considering the severe work performed by the troops in transporting their stores, &c., through a very difficult country.

The details of the Expedition are so fully and clearly given in the Report by Surgeon Young of the 60th Regiment, the Medical Officer in charge, at pp. 448–473 of this volume, that it seems unnecessary here to enter into any fuller details.

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SANITARY REPORT.

Inspector-General McIllree reports:—

The general health of the troops serving in the Dominion of Canada has throughout the whole period been remarkably good.

At particular stations some sanitary defects have been noted, but none that have acted prejudicially on the health of the men.

As the success of the Red River Expeditionary Force is mainly to be attributed to hygienic measures, I may mention that the robust health of the soldiers, and their immunity from crime, are attributed by the Medical Officers to selection of the men and total abstinence from the use of intoxicating liquors.

The men who are engaged in the most laborious work in this country, the lumber men, never use anything stronger than tea.

At St. George's Island a new barrack, with cook house, has been built for the accommodation of 50 men. A small building has also been erected at Sambro Island for the signalmen.

The new garrison hospital was opened in the month of April, affording large cubic space, increase of superficial area, and good ventilation to the inmates.

Some inconvenience has arisen from the water-pipes within the hospital bursting during the continuance of frosty weather, and this will require alteration before the next winter.

The warming of the large wards is effected by means of a couple of patent stoves placed near either extremity of the apartments; but their efficiency in this climate has not been sufficiently tested. The wards are lighted by gas.

A third block forming part of the married quarters was completed in May, the whole furnishing accommodation for 84 families.

This provision has added much to their comfort and respectability, by removing them from influences by which they were surrounded, when compelled to occupy such abodes as the married soldiers' pay would enable them to hire.

The system of introducing the water into the ablution room and lavatory at the married quarters requires alteration to fit it for the climate in winter.

The water supply is now abundant, and of excellent quality. The water from the city waterworks in Halifax has been introduced into the Citadel and Wellington Barracks.

The soldier's rations are unchanged, and the vegetable supply is abundant. The soldier may supplement his diet very readily at Halifax, where there is generally an abundant supply of excellent fish at a very cheap rate.

The clothing of the men in winter is well suited to the climate, but, in summer, materials of a lighter texture would be an improvement, as the heat is occasionally very great. The forage cap is all that is generally necessary to protect the head; there are but few days when a white cover would be advantageous.

The system of fining—lately introduced for the purpose of checking intemperance, and the crimes to which it leads,—has not been found sufficient to answer this end. This vice seems to be as great as ever. Games and amusement generally, with reading, interest the soldier for some time; but he requires something more, and if the steady soldier were permitted to work at the trade or occupation at which he was employed before he entered the

*Dominion of Canada.*

Army, he would occupy his spare time more reasonably, as well as profitably. If such permission were granted to the well conducted soldier, it would be a great boon, and conducive to good conduct, comfort, and morality.

Sanitary measures in the towns on this side of the Atlantic are too often neglected, and Halifax in this respect is no better than the others.

During the summer small-pox prevailed among the civil population, but did not extend to the military.

The climate is, no doubt, a healthy one, but in consequence of the extreme moisture of the air, pectoral and rheumatic complaints are prevalent at certain seasons of the year. Halifax may be regarded as one of the most healthy stations.

As regards the prevalence of venereal, I am not aware of any local ordinance or law on the subject.

Halifax and Quebec, being seaport towns, furnish more cases of venereal than cities more inland, but there does not appear to be any special prevalence or immunity from this class of diseases.

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## *Section* II.

### *On the Extent of Invaliding.*

During the year, 108 invalids were sent home, 16 were discharged in the Command, and 54 were finally discharged at Netley. These numbers give the proportion of 23·9 per 1,000 of the strength sent home as invalids, and 15·4 discharged the Service. The disabilities are detailed in Abstract No. 12 in the Appendix, of which the following is a classified summary:—

| Disabilities. | Invalids sent home. | Invalids Discharged the Service. | |
|---|---|---|---|
| | | In Canada. | At Netley. |
| Continued Fever.. .. .. .. | 1 | .. | .. |
| Rheumatism .. .. .. .. | 11 | .. | 3 |
| Syphilis .. .. .. .. | 7 | 2 | 4 |
| Scrofula and Phthisis .. .. .. | 18 | .. | 18 |
| Other Constitutional Diseases .. .. | 2 | .. | 1 |
| Diseases of the— | | | |
| Nervous System .. .. .. | 13 | 1 | 2 |
| Eye and Ear .. .. .. .. | 6 | .. | 4 |
| Circulatory System .. .. .. | 9 | 6 | 2 |
| Respiratory „ .. .. .. | 12 | 2 | 3 |
| Digestive „ .. .. .. | 4 | 3 | 3 |
| Urinary „ .. .. .. | 2 | .. | 1 |
| Generative „ .. .. .. | 2 | 1 | 1 |
| Organs of Locomotion .. .. | 4 | .. | 3 |
| Cellular Tissue.. .. .. .. | 3 | .. | 2 |
| Cutaneous System .. .. .. | 4 | 1 | 2 |
| Debility .. .. .. .. .. | 7 | .. | 2 |
| Accidental Injuries .. .. .. | 3 | .. | 3 |
| Total .. .. .. .. | 108 | 16 | 54 |
| Ratio per 1,000 of Mean Strength .. .. { 1870 .. | 23·9 | 3·5 | 11·9 |
| { 1860–9.. | 16·0 | 2·2 | 10·6 |

The number of invalids sent home was considerably above the average, but this may have been to some extent affected by the reductions in the strength of the Force employed; the proportion finally discharged was only slightly in excess. Tubercular and scrofulous diseases were the most common causes of disability, diseases of the nervous and respiratory systems and rheumatism ranking next in frequency. *Dominion of Canada.*

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*Section* III.

*Mean Daily Sick.*

The average number constantly non-effective from sickness throughout the year was 140, or 30·98 per 1,000 of mean strength, being slightly higher than in 1869. The usual information, deduced from these numbers, is given in the following Table:—

| | 1870. | 1860–69. |
|---|---|---|
| Ratio per 1,000 of strength constantly sick .. | 30·98 | 30·35 |
| | days. | days. |
| Average sick time to each soldier .. .. | 11·31 | 12·51 |
| Average duration of the cases of disease .. | 17·20 | 17·18 |

These results differ very slightly from the average of the last 10 years. The proportion of mean daily sick is about one-fourth lower than among the troops serving in the United Kingdom, and is slightly below that among troops in Gibraltar.

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*Section* IV.

*On the Influence of Age on the Mortality.*

The numbers living and the deaths, at each age, in the corps which served in the Command throughout the year, are stated in Abstract No. 13 in the Appendix; the results are shown in the following Table:—

| | | Under 20 | 20 and under 25. | 25 and under 30. | 30 and under 35. | 35 and under 40. | 40 and upwards. |
|---|---|---|---|---|---|---|---|
| Ratio of Deaths per 1,000 of mean strength | 1870 .. | .. | 7·70 | 1·29 | 14·49 | 10·99 | .. |
| | 1860–69 | 3·51 | 5·89 | 9·87 | 11·29 | 17·63 | 19·66 |

## IV. ON THE HEALTH OF THE TROOPS SERVING IN BERMUDA.

### *Section* I.

### *Sickness and Mortality.*

#### STATISTICAL REPORT.

*Bermuda.* In June, the 9th Company Royal Engineers left Bermuda for Canada, and in the end of November, the 3rd Company R.E. and the 69th Regiment arrived from that Command. In the beginning of December, the 1st Battalion 15th Regiment embarked for England, and in the middle of the month two batteries 3rd Brigade R.A. from Canada replaced two of the 1st Brigade, which returned home, and the 53rd Regiment from Barbadoes relieved the 61st, which proceeded to Halifax; at the same time the 4th and 18th Companies R.E. returned to England.

The average strength of the troops during the year was 1,908; the admissions into hospital were 1,416 and the deaths 23, of which 12 occurred out of hospital. The admissions were in the ratio of 742, and the deaths of 12·06 per 1,000 of mean strength, being considerably lower than in the preceding year. There were no deaths among the invalids sent to England.

The sickness and mortality were distributed among the different corps as follows:—

| | Average Annual Strength. | Admitted into Hospital. | Died. | | | | Ratio per 1,000 of Strength. | |
|---|---|---|---|---|---|---|---|---|
| | | | In Hospital. | Out of Hospital. | Of Invalids. | Total. | Admitted. | Died. |
| Royal Artillery.. .. | 187 | 105 | 2 | 1 | .. | 3 | 562 | 16·04 |
| „ Engineers .. | 378 | 359 | .. | 2 | .. | 2 | 950 | 5·29 |
| 1st Bn. 15th Regiment | 606 | 519 | 3 | 6 | .. | 9 | 856 | 14·85 |
| 53rd Regiment.. .. | 23 | 16 | .. | .. | .. | .. | 696 | .. |
| 61st „ .. .. | 618 | 330 | 3 | 3 | .. | 6 | 534 | 9·71 |
| 69th „ .. .. | 61 | 81 | 3 | .. | .. | 3 | 1,328 | 49·18 |

The following Table, framed from Abstract No. 12 in the Appendix, shows the influence of the different classes of diseases upon the admissions and deaths:—

| Orders. | Diseases. | 1870. Average Strength, 1,908. | | | | | | 1869. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Admitted into Hospital. | Deaths. | | | Annual ratio per 1,000 of Strength. | | Annual ratio per 1,000 of Strength. | |
| | | | At Bermuda. | Of Invalids. | Total. | Admitted. | Died. | Admitted. | Died. |
| | I. *General Diseases.* | | | | | | | | |
| 1 | Febrile Group .. | 215 | 5 | .. | 5 | 112·7 | 2·62 | 145·5 | 6·55 |
| 2 | Constitutional „ .. | 165 | 3 | .. | 3 | 86·5 | 1·57 | 78·0 | 1·51 |
| | II. *Local Diseases.* | | | | | | | | |
| | Diseases of the— | | | | | | | | |
| 1 | Nervous system .. | 17 | .. | .. | .. | 8·9 | .. | 12·6 | 2·01 |
| 2 | Eye .. .. .. | 54 | .. | .. | .. | 28·3 | .. | 41·3 | .. |
| 3 | Ear .. .. .. | 3 | .. | .. | .. | 1·6 | .. | 7·1 | .. |
| 4 | Nose .. .. .. | .. | .. | .. | .. | .. | .. | ·5 | .. |
| 5 | Circulatory system .. | 14 | 2 | .. | 2 | 7·3 | 1·05 | 11·1 | 1·51 |
| 6 | Absorbent „ .. | 33 | .. | .. | .. | 17·3 | .. | 4·5 | .. |
| 8 | Respiratory „ .. | 102 | .. | .. | .. | 53·5 | .. | 48·3 | .. |
| 9 | Digestive „ .. | 302 | 1 | .. | 1 | 158·3 | ·52 | 191·8 | 2·52 |
| 10 | Urinary „ .. | 62 | 1 | .. | 1 | 32·5 | ·52 | 29·7 | 1·01 |
| 11 | Generative „ .. | 12 | .. | .. | .. | 6·3 | .. | 13·6 | .. |
| 12 | Organs of Locomotion.. | 8 | .. | .. | .. | 4·2 | .. | 1·0 | .. |
| 13 | Cellular Tissue.. .. | 27 | .. | .. | .. | 14·1 | .. | 20·1 | ·50 |
| 14 | Cutaneous system .. | 154 | .. | .. | .. | 80·7 | .. | 110·3 | .. |
| | III. *Conditions, &c.* | | | | | | | | |
| | Debility .. .. .. | 26 | .. | .. | .. | 13·6 | .. | 9·6 | .. |
| | IV. *Poisons* .. | 26 | 3 | .. | 3 | 13·6 | 1·57 | 35·3 | ·50 |
| | V. *Injuries.* | | | | | | | | |
| 2 | Accidental.. .. .. | 195 | 7 | .. | 7 | 102·2 | 3·69 | 132·9 | ·50 |
| 4 | Self-inflicted .. .. | .. | 1 | .. | 1 | .. | ·52 | ·5 | 2·52 |
| | VI. *Surgical Operations*.. | 1 | .. | .. | .. | ·5 | .. | .. | .. |
| | Total .. .. | 1,416 | 23 | .. | 23 | 742·1 | 12·06 | 893·7 | 19·13 |
| | Average of 10 years 1860-69 | .. | .. | .. | .. | 766·6 | 29·88 | .. | .. |

The admissions have been slightly and the deaths very much under the average of the last 10 years. Compared with the results for 1869 there has been a marked decrease both in admissions and deaths, in the former chiefly in the febrile group of general diseases, in diseases of the eye, the digestive and cutaneous systems, in the class of poisons and in accidental injuries, and in the deaths by the febrile group, and by diseases of the nervous and digestive systems.

General Diseases.—The diseases of the febrile group of this class were much less prevalent and fatal than in 1869, while there was a slight increase in those of the constitutional group. The admissions and deaths by the principal affections in these groups were as follows :—

*Bermuda.*

| Diseases. | Admitted. | Died. | Ratio per 1,000 of Mean Strength. 1870. Admitted. | 1870. Died. | 1869. Admitted. | 1869. Died. |
|---|---|---|---|---|---|---|
| *Febrile—* | | | | | | |
| Continued Fevers .. .. .. | 204 | 5 | 106·9 | 2·62 | 119·3 | 6·55 |
| Paroxysmal „ .. .. .. | .. | .. | .. | .. | 3·0 | .. |
| Influenza .. .. .. .. | 10 | .. | 5·2 | .. | 22·2 | .. |
| Erysipelas .. .. .. .. | 1 | .. | ·5 | .. | ·5 | .. |
| Other Diseases of this group .. | .. | .. | .. | .. | ·5 | .. |
| *Constitutional—* | | | | | | |
| Rheumatism .. .. .. .. | 65 | .. | 34·1 | .. | 51·4 | .. |
| Syphilis .. .. .. .. | 79 | .. | 41·4 | .. | 17·6 | .. |
| Scrofula, Phthisis, &c. .. .. | 21 | 3 | 11·0 | 1·57 | 7·5 | 1·00 |
| Other Diseases of this group .. | .. | .. | .. | .. | 1·5 | ·50 |

*Continued Fevers* were less prevalent and much less fatal than in 1869; the ratio of admissions, however, was above, but that of deaths a little below, the average of the preceding 10 years. The reduction upon the results of last year took place in enteric fever. Satisfactory, however, as the decrease has been, the mortality by fever would have been still lower but for three deaths in 28 cases which occurred in the 69th Regiment during the short period it served in the island, from the 28th November till the end of the year, and in some of which at least the origin could scarcely be attributed to Bermuda. The Surgeon of the Regiment states that on the passage from Quebec to Bermuda, "the weather was most severe, entailing the necessity of "keeping shut the ports, scuttles, and most of the means of ventilation, the "result being foulness of air and extreme heat and closeness between decks. "This was remarked more particularly in the hospital, where the means of "ventilation were particularly defective." During the passage a private died of enteric fever, but his death is of course not included in the Bermuda Returns. On the 1st December, three days after the arrival of the corps, a Serjeant was admitted into hospital with enteric fever, and ultimately died on the 2nd January, 1871, but his death does not appear in the Returns for 1870. On the 2nd December, a case of simple continued fever was admitted, and died on the 13th from perforation of the intestine. On the 12th, a Serjeant was admitted with enteric fever, and died on the 21st, and on the 23rd another case occurred in a private of the regiment, which terminated fatally on the 29th. There seem grounds for believing that a considerable proportion of the 28 cases were due to causes in operation before the regiment landed in the Command.

*Syphilis* was much more prevalent than in 1869, and was also above the average of the last 10 years, but the excess was probably in a great measure due to the change of troops, as one-fourth of the admissions occurred in December, and the 69th Regiment had relatively a very high proportion of cases.

Local Diseases.—There has been a considerable reduction in the admissions by *diseases of the eye*, chiefly from a decrease of tarsal ophthalmia.

*Diseases of the Digestive System* were also much less prevalent, principally dysentery and diarrhœa. There was an increase in the admissions for dyspepsia, probably such cases as were the result of intemperance. A marked decrease in cases of ulcers and boils caused a very considerable reduction in *diseases of the integumentary system*

POISONS.—The decrease in the admissions under this class has been the result of a reduction in the cases of delirium tremens, but there has unfortunately been a great increase in the mortality, from the occurrence of three deaths from excessive drinking—one in the Royal Artillery and two in the 61st Regiment.

INJURIES.—The admissions for accidental injuries were considerably under the amount of the preceding year, but the mortality was very high, seven deaths having been caused by them. Four of these were by drowning, one by a fall into the bottom of the ditch at Fort Victoria, one by choking while a prisoner in the guard-room, and one the result of an explosion on the Royal Engineer works at Paynter's Vale. The last was the only one on duty, and there is too much reason to fear that most of the others were the results of intemperance.

There was one suicidal death by chloride of zinc.

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SANITARY REPORT.

Deputy Inspector-General Bowen reports:—

The health of the troops has been extremely good during the year, and does not appear to have suffered in any material degree from any defect in barracks, duties, &c.

The healthiness has been in part attributed to a recommendation I made, that a larger number of men than usual should be kept under canvas in the hot weather, so that each barrack-room and hut should be kept completely vacant, in turn, for a fortnight at least, and during that time fully cleansed, purified, and ventilated.

My opinion relative to the injury caused here by spirit drinking is unchanged. Nearly 25 per cent. of the deaths during the year were due to the excessive use of ardent spirits, and much of the sickness was indirectly due to intemperance.

On the arrival of new regiments in the command, and the relief of the former ones, an order was issued by the Officer Commanding the troops that spirits should not be sold in the regimental canteens. The Officers Commanding corps, however, objected to this after a short trial, for reasons affecting the discipline of the men, and the order was modified into a recommendation that spirits should only be sold between the evening meal and tattoo. This, if carried out strictly, will, no doubt, prevent much of the dram-drinking hitherto so prevalent; but I regret that beer cannot be supplied at a low rate.

Further experience of the red serge patrol jacket confirms me in the opinion that it is not so good a dress for the men in hot weather as some white material that could be washed; the serge becomes so soon saturated with perspiration as to be unfit for wear.

A few cases of enteric fever occurred in the 69th Regiment immediately on their arrival in the command,—some indeed while actually on board ship; they were clearly not due to any cause arising in this island, but possibly to confinement between decks during some very bad weather experienced on the voyage.

There is no local act relative to venereal diseases, but affections of this nature are rare in this country. The admissions from this cause have been increased this year, apparently owing to a number of men with that complaint having been brought here by the 69th Regiment from Canada.

Much care was taken in inspecting and admitting into hospital the men of this corps, so as to prevent any spreading of the disease in these islands.

The following sanitary services have been completed during the year, or are in course of execution:—

*Boaz.*—Improved drainage for Gordon Terrace. Provision of means for flushing drains. Warren's cooking apparatus in men's cook-house.

*Prospect.*—Benham's range in hospital kitchen.

*St. George's.*—Hospital store for infected bedding.

Some other improvements have been sanctioned, and I have recommended that a verandah be added to the hospital at Prospect.

*Bermuda.*

## *Section* II.

### *On the Extent of Invaliding.*

There were 39 invalids sent to England during the year and 14 finally discharged the Service at Netley, being respectively in the ratio of 20·4 and 7·3 per 1,000 of mean strength, both under the proportion in the preceding year.

The disabilities of the invalids are detailed in Abstract No. 12 in the Appendix, of which the following is a classified summary.

| Disabilities. | | Invalids sent Home. | Discharged the Service at Netley. |
|---|---|---|---|
| Rheumatism .. .. .. | | 3 | 1 |
| Syphilis .. .. .. .. | | .. | 1 |
| Scrofula and Phthisis .. .. | | 5 | 2 |
| Diseases of the— | | | |
| Nervous System .. .. .. | | 5 | .. |
| Eye .. .. .. .. .. | | 8 | 4 |
| Circulatory system.. .. .. | | 5 | 4 |
| Respiratory „ .. .. .. | | 2 | .. |
| Digestive „ .. .. .. | | 2 | .. |
| Generative „ .. .. .. | | 1 | 1 |
| Cutaneous „ .. .. .. | | 2 | 1 |
| Debility .. .. .. .. | | 5 | .. |
| Surgical operations .. .. | | 1 | .. |
| Total .. .. .. | | 39 | 14 |
| Ratio per 1,000 of strength | 1870.. | 20·4 | 7·3 |
| | 1860–9 | 20·9 | 13·6 |

The proportion of invalids sent home corresponded very closely with the average of the last 10 years, but the discharges from the Service amounted to only half the average. As in 1869, diseases of the eye were the most frequent cause of invaliding, and the 1st Battalion 15th Regiment furnished the largest number of cases, five of the eight sent home on this account being men of that corps.

## *Section* III.

### *Mean Daily Sick.*

The average number constantly non-effective from sickness during the year was 74, or in the ratio of 38·78 per 1,000 of mean strength. The following Table gives the usual information on this head :—

| | 1870. | 1860–69. |
|---|---|---|
| Ratio per 1,000 of strength constantly Sick .. .. .. | 38·78 | 39·60 |
| | days. | days. |
| Average Sick time to each Soldier .. .. .. .. .. | 14·16 | 14·45 |
| Average duration of the cases of Disease .. .. .. .. | 19·07 | 18·85 |

The results correspond very closely with those of the preceding year, except that there has been an increase in the duration of the cases, and they differ but little from the average of the last 10 years. *Bermuda.*

## *Section* IV.

### *On the Influence of Age on the Mortality.*

The following Table shows the ages of the men, and the deaths at each age, in those corps which served in Bermuda during the whole of the year:—

| Corps. | Under 20 Years. | | 20 and under 25. | | 25 and under 30. | | 30 and under 35. | | 35 and under 40. | | 40 and upwards. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. |
| Royal Artillery ... ... ... | 7 | ... | 50 | 1 | 147 | ... | 59 | 2 | 20 | ... | ... | ... |
| 1st Battalion 15th Foot ... ... | 20 | ... | 273 | 2 | 226 | 4 | 132 | 2 | 24 | ... | ... | ... |
| 61st Regiment ... ... ... | 156 | ... | 189 | ... | 164 | 4 | 127 | 1 | 48 | 1 | ... | ... |
| Total ... ... ... | 383 | ... | 572 | 3 | 537 | 8 | 318 | 5 | 92 | 2 | ... | ... |
| Ratio per 1,000 of Strength { 1870 ... ... | ... | | 5·85 | | 14·89 | | 15·72 | | 21·73 | | ... | |
| { 1860-69 ... | 3·82 | | 13·29 | | 23·39 | | 22·81 | | 45·96 | | 14·81 | |

The ratios of deaths at the different ages, though much under the average of the preceding ten years, furnish analogous results, there being a break in the progressive increase of mortality at the ages of 30 and under 35 years.

# V.—ON THE HEALTH OF THE TROOPS SERVING IN THE WEST INDIES.

## *Section I.*

## *Sickness and Mortality.*

### I. Windward and Leeward Command.

#### STATISTICAL REPORT.

#### 1. White Troops.

*Windward and Leeward Command.*

In the beginning of December, five Companies of the 29th Regiment from Jamaica relieved the 53rd Regiment, which proceeded to Bermuda. The average strength of the white troops during the year was 769; the admissions into hospital were 712, and the deaths were 12, including two of invalids at Jamaica, on their way to England, and one at Netley. The admissions were in the ratio of 926 and the deaths of 15·60 per 1,000 of mean strength, the former being considerably under and the latter nearly thrice as high as in the preceding year.

The diseases which gave rise to this sickness and mortality are detailed in Abstract No. 14 in the Appendix, from which the following classified summary has been framed:—

*Windward and Leeward Command.*

| Orders. | Diseases. | 1870. Strength, 769. Admitted. | Died. In the Command. | Died. Of Invalids. | Died. Total. | 1870. Ratio per 1,000. Admitted. | 1870. Ratio per 1,000. Died. | 1869. Ratio per 1,000. Admitted. | 1869. Ratio per 1,000. Died. |
|---|---|---|---|---|---|---|---|---|---|
| | I. *General Diseases.* | | | | | | | | |
| 1 | Febrile Group | 215 | 5 | .. | 5 | 279·6 | 6·50 | 308·8 | 1·13 |
| 2 | Constitutional „ | 75 | 2 | 1 | 3 | 97·5 | 3·90 | 153·9 | 2·26 |
| | II. *Local Diseases.* Diseases of the— | | | | | | | | |
| 1 | Nervous System .. | 6 | .. | 1 | 1 | 7·8 | 1·30 | 13·6 | 1·13 |
| 2 | Eye .. .. .. | 3 | .. | .. | .. | 3·9 | .. | 30·6 | .. |
| 3 | Ear .. .. .. | 3 | .. | .. | .. | 3·9 | .. | 21·5 | .. |
| 4 | Nose.. .. .. | .. | .. | .. | .. | .. | .. | 2·3 | .. |
| 5 | Circulatory System . | 5 | 2 | 1 | 3 | 6·5 | 3·90 | 5·7 | .. |
| 6 | Absorbent „ .. | 19 | .. | .. | .. | 24·7 | .. | 19·2 | .. |
| 8 | Respiratory „ .. | 44 | .. | .. | .. | 57·2 | .. | 29·4 | .. |
| 9 | Digestive „ .. | 65 | .. | .. | .. | 84·5 | .. | 89·2 | 1·13 |
| 10 | Urinary „ .. | 67 | .. | .. | .. | 87·1 | .. | 125·6 | .. |
| 11 | Generative „ .. | 4 | .. | .. | .. | 5·2 | .. | 6·8 | .. |
| 12 | Organs of Locomotion | 2 | .. | .. | .. | 2·6 | .. | 2·3 | .. |
| 13 | Cellular Tissue .. | 38 | .. | .. | .. | 49·4 | .. | 19·2 | .. |
| 14 | Cutaneous System .. | 91 | .. | .. | .. | 118·4 | .. | 93·9 | .. |
| | III. *Conditions, &c.* | 2 | .. | .. | .. | 2·6 | .. | .. | .. |
| | IV. *Poisons* .. | 14 | .. | .. | .. | 18·2 | .. | 26·0 | .. |
| | V. *Injuries.* | | | | | | | | |
| 2 | Accidental .. .. | 59 | .. | .. | .. | 76·7 | .. | 118·8 | .. |
| 4 | Self-inflicted .. | .. | .. | .. | .. | .. | .. | 1·1 | .. |
| | VI. *Surgical Operations* .. .. | .. | .. | .. | .. | .. | .. | 1·1 | .. |
| | No appreciable disease .. .. | .. | .. | .. | .. | .. | .. | 1·1 | .. |
| | Total.. .. | 712 | 9 | 3 | 12 | 925·8 | 15·60 | 1070·1 | 5·65 |
| | Average of 10 years 1860–69 .. .. | .. | .. | .. | .. | 1185·6 | 11·96 | .. | .. |

The ratio of admissions is much lower, but of deaths considerably higher, than the average of the last 10 years.

GENERAL DISEASES were less prevalent, but more fatal, than in 1869. The admissions and deaths by the principal diseases in this class were as follows :—

*Windward and Leeward Command.*

| General Diseases. | Admitted. | Died. | Ratio per 1,000 of Mean Strength. | | | |
|---|---|---|---|---|---|---|
| | | | 1870. | | 1869. | |
| | | | Admitted. | Died. | Admitted. | Died. |
| *Febrile—* | | | | | | |
| Continued Fevers .. .. .. | 202 | 3 | 262·7 | 3·90 | 144·8 | .. |
| Yellow Fever .. .. .. | 2 | 2 | 2·6 | 2·60 | 20·4 | 1·13 |
| Paroxysmal Fevers.. .. .. | 6 | .. | 7·8 | .. | 140·3 | .. |
| Influenza .. .. .. .. | 4 | .. | 5·2 | .. | 2·3 | .. |
| Erysipelas .. .. .. .. | 1 | .. | 1·3 | .. | 1·1 | .. |
| *Constitutional—* | | | | | | |
| Rheumatism .. .. .. | 17 | .. | 22·1 | .. | 13·6 | .. |
| Syphilis .. .. .. .. | 52 | .. | 67·6 | .. | 112·0 | .. |
| Scrofula, Phthisis, &c. .. .. | 3 | 3 | 3·9 | 3·90 | 19·2 | 1·13 |
| Anæmia .. .. .. .. | 1 | .. | 1·3 | .. | 4·5 | .. |
| Other Diseases of this group .. | 2 | .. | 2·6 | .. | 4·5 | .. |

*Continued Fevers* gave rise to a much higher proportion of cases than in 1869, but this was more than counterbalanced by the decrease in *paroxysmal fevers*, the general result in the two groups combined being a reduction of 15 per 1,000. The high ratio of admissions was in a great measure due to the prevalence of fever at Trinidad during the early months of the year. The disease was confined to the military, and was not, as in the previous year, epidemic among the civil population. Three of the cases terminated fatally. The disease affected the officers even more than the men, 9 cases having occurred among 11 of the former, and 62 in an average strength of 129 of the latter, but none of the cases of the officers proved fatal. The Medical Officers were of opinion that the disease was of malarial origin, although no periodicity could be detected.

Two fatal cases of *yellow fever* occurred at Barbadoes, but the disease was not contracted in that Island. They occurred in two men of the 53rd Regiment who came up from St. Vincent on Court Martial duty in the mail steamer. They landed at Barbadoes on the 28th December, 1869, were admitted into hospital on the 2nd and 3rd January, 1870, and died on the 4th and 6th of that month. The officer in charge of the party was also attacked, but recovered. It is stated that the chief officer of the "Tamar," in which the party came to Barbadoes, was ill at the time of yellow fever.

*Syphilis.*—The admissions by this disease were much below the average of the preceding 10 years. It was, however, still very prevalent in Barbadoes, where the admissions amounted to 94 per 1,000 of the strength; of the 52 cases, 50 occurred at Barbadoes and 2 at St. Vincent; there were no admissions under that head at Trinidad.

Local Diseases.—There was a very great reduction in *diseases of the eye*, but this was due to the removal from the Command of the 47th Regiment in which the very high proportion of cases in 1869 occurred, and the same remark applies to *diseases of the ear*. There was a marked reduction in *diseases of the urinary system*. The decrease was chiefly in the amount of gonorrhœa at Barbadoes, the admissions by it having been scarcely half as high as in the preceding year. There was a considerable increase in the admissions by *diseases of the cellular tissue* and of *the cutaneous system*, in the former from the occurrence of a number of cases of abscess, and in the latter of eczema in the 53rd Regiment. These do not appear to have been cases of any importance, and the Medical Officer in charge makes no remarks as to their probable cause.

Injuries gave rise to a much smaller proportion of admissions than in former years, and to no deaths, either accidental or self-inflicted.

The ratio of admissions and deaths at each of the three stations occupied by white troops during the year was as follows:— *Windward and Leeward Command.*

| | Ratio per 1,000 of mean strength. | |
|---|---|---|
| | Admissions. | Deaths. |
| Barbadoes .. .. .. .. | 958·6 | 9·42 |
| Trinidad .. .. .. .. | 1248·1 | 31·08 |
| St. Vincent's .. .. .. .. | 383·8 | .. |

The admissions and deaths in Barbadoes were higher than in 1869; in Trinidad there was a great decrease in the admissions and increase in the ratio of deaths; and at St. Vincent's there was a decrease in the sickness, and, as in that year, no death occurred. Trinidad still holds its place as the most unhealthy of the stations for white troops in the Command since these were withdrawn from British Guiana.

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### 2.—Black Troops.

In the middle of April, the head-quarters of the 2nd West India Regiment were moved from Barbadoes to Demerara, and in June a company from the West Coast of Africa joined them. Two companies then left Demerara for the West Coast, and two from the latter station arrived at Barbadoes in September.

The average annual strength of the black troops in the Command, including the corps of military labourers, was 456; the admissions were 431, and the deaths 5, being in the ratio of 945 and 10·97 per 1,000 of mean strength, or slightly above the proportion in the preceding year.

The following Table, compiled from Abstract No. 15 in the Appendix, shows the influence of the different classes of diseases in causing the sickness and mortality:—

*Windward and Leeward Command.*

| Orders. | Diseases. | Black Troops. 1870. Strength 456. Admitted. | Died. | Ratio per 1,000. Admitted. | Died. | 1869. Ratio per 1,000. Admitted. | Died. |
|---|---|---|---|---|---|---|---|
| | I. *General Diseases.* | | | | | | |
| 1 | Febrile Group .. .. .. | 66 | 2 | 144·7 | 4·39 | 61·8 | .. |
| 2 | Constitutional „ .. .. | 93 | 1 | 203·9 | 2·19 | 370·9 | 6·62 |
| | II. *Local Diseases.* Diseases of the— | | | | | | |
| 1 | Nervous System .. .. .. | 10 | .. | 21·9 | .. | 26·5 | 2·21 |
| 2 | Eye .. .. .. .. | 6 | .. | 13·2 | .. | 8·8 | .. |
| 5 | Circulatory System .. .. | .. | .. | .. | .. | 2·2 | .. |
| 6 | Absorbent „ .. .. | 13 | .. | 28·5 | .. | 6·6 | .. |
| 8 | Respiratory „ .. .. | 39 | .. | 85·5 | .. | 15·5 | .. |
| 9 | Digestive „ .. .. | 45 | 2 | 98·7 | 4·39 | 39·7 | .. |
| 10 | Urinary „ .. .. | 39 | .. | 85·5 | .. | 134·7 | .. |
| 11 | Generative „ .. .. | 18 | .. | 39·5 | .. | 17·7 | .. |
| 12 | Organs of Locomotion .. .. | 2 | .. | 4·4 | .. | 11·0 | .. |
| 13 | Cellular Tissue .. .. .. | 6 | .. | 13·2 | .. | 13·2 | .. |
| 14 | Cutaneous System .. .. | 48 | .. | 105·3 | .. | 77·3 | .. |
| | III. *Conditions, &c.* | | | | | | |
| | Debility .. .. .. .. | .. | .. | .. | .. | 2·2 | .. |
| | IV. *Poisons* .. .. | 1 | .. | 2·2 | .. | .. | .. |
| | V. *Injuries.* | | | | | | |
| 2 | Accidental .. .. .. .. | 43 | .. | 94·3 | .. | 125·8 | .. |
| | No appreciable disease .. .. | 2 | .. | 4·4 | .. | .. | .. |
| | Total .. .. | 431 | 5 | 945·2 | 10·97 | 913·9 | 8·83 |
| | Average of 10 years, 1860-69.. | .. | .. | 903·5 | 21·15 | .. | .. |

The admissions have been somewhat above the average of the last 10 years, but the deaths have been scarcely half the average.

General Diseases have furnished a lower ratio of admissions than in 1869, but without any corresponding decrease in the deaths. The diseases have, however, been differently distributed, there having been a considerable increase in those of the febrile group, and a still more marked decrease in those of the constitutional group. The following Table shows the prevalence of the chief diseases comprised in this class:—

*Windward and Leeward Command.*

| General Diseases. | Admitted. | Died. | Annual Ratio per 1,000 of Mean Strength. 1870. Admitted. | 1870. Died. | 1869. Admitted. | 1869. Died. |
|---|---|---|---|---|---|---|
| *Febrile Group—* | | | | | | |
| Continued Fevers .. .. | 19 | 2 | 41·6 | 4·39 | 6·6 | .. |
| Paroxysmal „ .. .. .. | 32 | .. | 70·2 | .. | 44·2 | .. |
| Influenza .. .. .. | 1 | .. | 2·2 | .. | 11·0 | .. |
| Other diseases of this group .. | 14 | .. | 30·7 | .. | .. | .. |
| *Constitutional Group—* | | | | | | |
| Rheumatism .. .. .. | 43 | .. | 94·3 | .. | 57·4 | .. |
| Syphilis .. .. .. .. | 41 | .. | 89·9 | .. | 291·4 | .. |
| Scrofula, Phthisis, &c. .. .. | 8 | 1 | 17·5 | 2·19 | 19·9 | 6·62 |
| Anæmia .. .. .. .. | 1 | .. | 2·2 | .. | 2·2 | .. |

*Continued* and *Paroxysmal Fevers* were more prevalent than in 1869; this may have been to some extent due to the circumstance that during the latter half of the year a considerable proportion of the Force consisted of men who had just returned from the West Coast of Africa. The 14 admissions under other diseases of the febrile group were cases of mumps, which all occurred at Demerara during the last quarter of the year, but regarding which no special remarks were made by the Medical Officer in charge.

The great decrease in the constitutional group of general diseases took place in syphilis, the admissions by which amounted to scarcely one-third of the proportion in 1869, and were one-fourth under that of the preceding ten years. The average number constantly in hospital from syphilis during the year amounted to 7·72 per 1,000 of mean strength, or little more than two-fifths of the proportion in the preceding year, and the loss of service by it was equal to that of the whole of the black troops for 2·82 instead of 6·44 days.

Local Diseases.—There was a considerable increase in diseases of the respiratory and digestive systems, in the former from bronchitis, and in the latter from tonsillitis. Diseases of the generative and cutaneous systems were also much more prevalent, the excess being in orchitis in the former and ulcers in the latter; while there was a marked reduction in diseases of the urinary system, chiefly gonorrhœa.

Injuries gave rise to a considerably lower rate of admissions than in 1869, notwithstanding the occurrence of 16 from blisters of the feet, caused by new boots issued to the recruits.

When the numbers are so small, as in the present instance, considerable fluctuations must be looked for in the relative prevalence of the different classes of diseases.

The admissions into hospital of black troops at Barbadoes were 773·5 and the deaths 17·09 per 1,000 of mean strength; at Demerara they were respectively 1,217·2 and 5·05 per 1,000.

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### SANITARY REPORT.

Deputy Inspector-General Fraser reports:—

The white troops in Barbadoes have been very healthy. Two cases (the only admissions) of yellow fever proved fatal at Barbadoes on the 4th and 6th January respectively. The subjects of it were on escort duty from St. Vincent, from which island they arrived on the 28th of December, implying that they contracted the disease in transit.

Simple continued fever was prevalent in July, August, and September, but happily without any fatal results.

*Windward and Leeward Command.*

From the following condensed statement of the condition of the barracks and hospital at Barbadoes, it will be manifest that no special allegation can be made against their defective sanitary condition, as an apparent cause of disease during the year.

The Royal Artillery Barracks at St. Ann's, with its mean annual number of occupants, is in a very satisfactory state in respect of cubic space accommodation, which has averaged more than 1,000 cubic feet, and about 80 superficial feet, per man.

The ventilation of the lower, as well as upper, rooms has been very good, and the ablution, bath, and urinal arrangements (Jenning's patent) for each room, with separate light and ventilators, are excellent.

The drainage and sewerage into the sea, with the water latrines, urinals, and sinks (outside) have been most effective.

The rations, especially the bread, are of fair quality, and the cooking is sufficiently varied by baking, stewing, &c.

The men's clothing is suitable to the climate.

The married quarters (hired) are very bad and require reconstruction.

The Infantry, or brick barrack, St. Ann's, is not quite equal to the former as regards its sanitary condition. It is estimated to accommodate 300 men at about 1,000 cubic feet, and 80 square feet, per inmate. This number has been necessarily somewhat exceeded, but sometimes the mean cubic space, especially in the upper storeys has amounted to fully 1,000 feet per man.

The transverse natural ventilation is good, but could be improved in the upper rooms by outlets in the ridge, and by making openings in the opposite walls, above the windows in the lower storeys, similar to those in the Royal Artillery Barrack.

The general drainage, with sewage into the sea, is effective. The water latrine and urinals are in good condition, but there is only one latrine for the south block, where a second one is desirable. This appears to have been contemplated in the original plan, and will probably be ultimately supplied, being only deferred from this year's estimates because of the expense.

The ablution rooms and baths are sufficient, with an ample supply of good water from the Bridgetown Waterworks for them, as well as for all other necessary purposes.

The cook-houses are excellent, furnished with patent stoves (Deane's) which afford sufficient variety of cooking.

The rations, especially the bread, are of good average quality ; the beef is often lean ; salt pork is issued once a week, but I think once a fortnight would be sufficient, and more in accordance with the tastes of the men, the majority of whom do not eat it. At Jamaica it is issued only once a fortnight. I also understand that pork is a little more expensive than beef.

The issue of mutton as a ration once a week was stopped in October because of the expense.

The clothing is generally suitable to the climate ; but a better head-dress is desirable, such as the wicker helmet worn in India.

The black troops have had fair average health. The iron barracks occupied by them would be in good sanitary condition, were it not for the cesspit privy for officers and men, a long standing nuisance, to remedy which, however, a water latrine has been included in the Commanding Royal Engineer's estimates for 1871–2.

The hospital is in a most satisfactory state in every respect, always excepting the site. Cubic space and superficial area have been ample, much above regulation (1,500 ft.), in consequence of the small number of patients. Natural ventilation, and also that by louvres in the ridge, is very good and the drainage by iron pipes into the sea is most effective.

The ablution room (for four wards), with fixed basins, baths, urinals, and sinks (Jenning's patent), with separate ventilation and light, and an abundant supply of water, is admirable.

A water latrine and urinal outside for convalescents and the guard have lately been completed ; this, and a water latrine for the families of hospital servants, are the only sanitary improvements which have been carried out during the year.

As regards the prevalence of venereal diseases, there has been a lock hospital in full operation during the year, the expense being divided between the Imperial and Local Governments. There has been comparative immunity from affections of this class. *Windward and Leeward Command.*

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## II. JAMAICA.

### STATISTICAL REPORT.

### 1. WHITE TROOPS.

IN the end of November five companies of the 29th Regiment embarked for the Windward and Leeward Command, leaving only three companies in Jamaica, and in the end of November the 6th Battery 4th Brigade Royal Artillery from Halifax relieved the 4th Battery, 1st Brigade. *Jamaica.*

The average strength of the White Troops during the year was 663, among whom 381 admissions into hospital and one death occurred, being respectively in the ratio of 575 and 1·51 per 1,000 of mean strength.

The diseases by which the sickness and mortality were caused are detailed in Abstract No. 14 in the Appendix, from which the following Table has been framed:—

*Jamaica.*

| Order. | Diseases. | 1870. Strength, 663. Admissions. | Deaths. In Jamaica. | Deaths. Of Invalids. | Deaths. Total. | 1870. Ratio per 1,000. Admitted. | Died. | 1869. Ratio per 1,000. Admitted. | Died. |
|---|---|---|---|---|---|---|---|---|---|
| | I. *General Diseases.* | | | | | | | | |
| 1 | Febrile Group.. .. | 83 | .. | .. | .. | 125·2 | .. | 123·6 | 14·54 |
| 2 | Constitutional „ .. .. | 43 | 1 | .. | 1 | 64·9 | 1·51 | 59·4 | 2·43 |
| | II. *Local Diseases.* | | | | | | | | |
| | Diseases of the— | | | | | | | | |
| 1 | Nervous System .. .. | 1 | .. | .. | .. | 1·5 | .. | 9·7 | 1·21 |
| 2 | Eye .. .. .. | 6 | .. | .. | .. | 9·0 | .. | 6·1 | .. |
| 3 | Ear .. .. .. | 2 | .. | .. | .. | 3·0 | .. | .. | .. |
| 4 | Nose .. .. .. | .. | .. | .. | .. | .. | .. | 1·2 | .. |
| 5 | Circulatory System .. | 4 | .. | .. | .. | 6·0 | .. | 15·8 | 1·21 |
| 6 | Absorbent „ .. | 11 | .. | .. | .. | 16·6 | .. | 14·5 | .. |
| 8 | Respiratory „ .. | 8 | .. | .. | .. | 12·1 | .. | 25·5 | .. |
| 9 | Digestive „ .. | 39 | .. | .. | .. | 58·8 | .. | 72·7 | .. |
| 10 | Urinary „ .. | 45 | .. | .. | .. | 67·9 | .. | 57·0 | 1·21 |
| 11 | Generative „ .. | 8 | .. | .. | .. | 12·1 | .. | 10·9 | .. |
| 12 | Organs of Locomotion .. | 8 | .. | .. | .. | 12·1 | .. | 7·3 | .. |
| 13 | Cellular Tissue .. .. | 3 | .. | .. | .. | 4·5 | .. | 8·5 | .. |
| 14 | Cutaneous System .. | 41 | .. | .. | .. | 61·9 | .. | 52·1 | .. |
| | III. *Conditions, &c.* | | | | | | | | |
| | Debility .. .. .. | 10 | .. | .. | .. | 15·1 | .. | 2·4 | .. |
| | IV. *Poisons.* .. | 15 | .. | .. | .. | 22·6 | .. | 31·5 | 1·21 |
| | V. *Injuries.* | | | | | | | | |
| 2 | Accidental.. .. .. | 54 | .. | .. | .. | 81·4 | .. | 121·2 | 1·21 |
| | Total .. | 381 | 1 | .. | 1 | 574·7 | 1·51 | 619·4 | 23·02 |
| | Average of 10 years 1860-9 | .. | .. | .. | .. | 948·9 | 21·83 | .. | .. |

The ratio of admissions was lower than in 1869, and much under the average of the last 10 years. The decrease, as compared with the preceding year, was chiefly in accidental injuries. The ratio of deaths was extremely low.

General Diseases differed little in prevalence from the results of the preceding year, but only one death occurred by them. The following Table shows the relative prevalence of the principal diseases comprised in this class:—

| General Diseases. | Admitted | Died. | Ratio per 1,000 of Mean Strength. 1870. Admitted | 1870. Died. | 1869. Admitted | 1869. Died. |
|---|---|---|---|---|---|---|
| *Febrile—* | | | | | | |
| Continued Fevers .. .. | 67 | .. | 101·1 | .. | 40·0 | .. |
| Yellow Fever .. .. .. | 1 | .. | 1·5 | .. | 17·0 | 13·33 |
| Paroxysmal Fevers .. .. | 13 | .. | 19·6 | .. | 65·4 | 1·21 |
| Erysipelas .. .. .. | .. | .. | .. | .. | 1·2 | .. |
| Other diseases of this group .. | 2 | .. | 3·0 | .. | .. | .. |
| *Constitutional—* | | | | | | |
| Rheumatism .. .. .. | 6 | .. | 9·1 | .. | 8·5 | .. |
| Syphilis .. .. .. .. | 27 | .. | 40·7 | .. | 44·8 | .. |
| Scrofula, Phthisis, &c. .. .. | 7 | 1 | 10·6 | 1·51 | 3·7 | 1·21 |
| Anæmia .. .. .. .. | 1 | .. | 1·5 | .. | .. | .. |
| Other diseases of this group .. | 2 | .. | 3·0 | .. | 2·4 | .. |

The ratio of admissions by continued fevers was much higher than in 1869, but this was counterbalanced by a marked reduction in cases of paroxysmal and yellow fevers, the proportion of admissions by the three types being exactly the same in the two years. There was only one admission by yellow fever, the patient being the Quartermaster-Serjeant of the 1st West India Regiment at Up Park Camp. The origin of the disease could not be traced. The results for the other diseases of this class corresponded very closely in the two years; there was an increase in the admissions by scrofula and phthisis in 1870, but without any corresponding change in the mortality. The admissions by syphilis show a slight reduction, and contrast favourably with the results for the Windward and Leeward Command.

The Local Diseases seem scarcely to require notice. The low ratio of admissions generally, and the exemption from mortality are very satisfactory features in the Table.

Injuries.—There was a considerable reduction in the amount of accidental injuries, and no case of self-inflicted injury occurred during the year.

## II.—Black Troops.

On the 12th May the 3rd West India Regiment was disbanded; in the end of June the Head-Quarters Wing of the 1st West India Regiment arrived from the West Coast of Africa and was followed in the beginning of October by the other Wing, which, however, furnished detachments to the Bahamas, and in the middle of November a detachment was also sent to Honduras.

The average strength of the Black Troops in Jamaica during the year was 516; the admissions into hospital from them were 349, and the deaths 19. These numbers give the ratio of 676 admissions and 36·81 deaths per 1,000 of mean annual strength, the former being very much under and the latter more than double the proportion in the preceding year.

The diseases which gave rise to these admissions and deaths are detailed in Abstract No. 15 in the Appendix, of which the following is a classified summary:—

*Jamaica.*

| Order. | Black Troops. Diseases. | 1870. Strength, 516. Admitted. | Died at Jamaica. | Ratio per 1,000. Admitted. | Died. | 1869. Ratio per 1,000. Admitted. | Died. |
|---|---|---|---|---|---|---|---|
| | I. *General Diseases.* | | | | | | |
| 1 | Febrile Group .. .. | 42 | 1 | 81·4 | 1·94 | 116·4 | 2·29 |
| 2 | Constitutional „ .. .. | 101 | 8 | 195·7 | 15·50 | 254·6 | 11·42 |
| | II. *Local Diseases.* Diseases of the— | | | | | | |
| 1 | Nervous System .. .. | 8 | 4 | 15·5 | 7·75 | 16·0 | 1·14 |
| 2 | Eye .. .. .. .. | 7 | .. | 13·5 | .. | 19·4 | .. |
| 5 | Circulatory System .. .. | 1 | 2 | 1·9 | 3·87 | 8·0 | .. |
| 6 | Absorbent „ .. .. | 10 | .. | 19·4 | .. | 24·0 | .. |
| 8 | Respiratory „ .. .. | 15 | 2 | 29·1 | 3·87 | 60·5 | .. |
| 9 | Digestive „ .. .. | 23 | .. | 44·6 | .. | 66·2 | .. |
| 10 | Urinary „ .. .. | 51 | .. | 98·8 | .. | 135·8 | 1·14 |
| 11 | Generative „ .. .. | 10 | .. | 19·4 | .. | 3·4 | .. |
| 12 | Organs of Locomotion .. | 8 | 1 | 15·5 | 1·94 | 14·8 | .. |
| 13 | Cellular Tissue .. .. | 17 | .. | 33·0 | .. | 14·8 | .. |
| 14 | Cutaneous System .. .. | 34 | .. | 65·9 | .. | 89·0 | .. |
| | III. *Conditions, &c.* | | | | | | |
| | Debility .. .. .. | 3 | .. | 5·8 | .. | 1·2 | .. |
| | V. *Injuries.* | | | | | | |
| 2 | Accidental .. .. .. | 17 | .. | 33·0 | .. | 74·2 | .. |
| 4 | Self-inflicted .. .. .. | 1 | 1 | 1·9 | 1·94 | .. | 1·14 |
| | VI. *Surgical Operations* .. | 1 | .. | 1·9 | .. | 1·2 | .. |
| | Total .. .. .. | 349 | 19 | 676·3 | 36·81 | 899·5 | 17·13 |
| | Average of 10 Years, 1860–9 .. | .. | .. | 1219·4 | 24·43 | .. | .. |

The admissions have been very much under, but the deaths one-half above, the average of the preceding ten years.

General Diseases have been considerably less prevalent, but rather more fatal than in 1869. The influence of the principal diseases comprised in the class is shown in the following Table:—

| General Diseases. | Admitted. | Died. | Annual Ratio per 1,000 of Mean Strength. | | | |
|---|---|---|---|---|---|---|
| | | | 1870. | | 1869. | |
| | | | Admitted. | Died. | Admitted. | Died. |
| *Febrile Group*— | | | | | | |
| Eruptive Fevers.. .. .. | .. | .. | .. | .. | 1·1 | .. |
| Continued „ .. .. .. | 25 | 1 | 48·3 | 1·94 | 92·5 | .. |
| Paroxysmal „ .. .. .. | 16 | .. | 31·1 | .. | 21·7 | 2·29 |
| Erysipelas .. .. .. | .. | .. | .. | .. | 1·1 | .. |
| Other diseases of this group .. | 1 | .. | 1·9 | .. | .. | .. |
| *Constitutional Group*— | | | | | | |
| Rheumatism .. .. .. | 14 | .. | 27·2 | .. | 60·5 | .. |
| Syphilis .. .. .. .. | 69 | .. | 133·7 | .. | 155·3 | .. |
| Scrofula, Phthisis, &c. .. .. | 18 | 8 | 34·8 | 15·50 | 35·4 | 11·41 |
| Anæmia .. .. .. .. | .. | .. | .. | .. | 2·3 | .. |
| Other diseases of this group .. | .. | .. | .. | .. | 1·1 | .. |

There was a marked decrease in the prevalence of *continued fevers* and a moderate increase in those of the paroxysmal type. *Rheumatism* was much less prevalent and there was a decrease in *syphilis*, but it was still a source of very considerable inefficiency, and furnished upwards of thrice as high a ratio of admissions as among the White Troops. *Scrofula* and *phthisis* continue to be the chief cause of mortality among this class of troops; the ratio of admissions by them was identical with that of 1869, but the death rate was a third higher.

Local Diseases have been the cause of a much higher rate of mortality than in the preceding year, especially those of the nervous system. The admissions into hospital were considerably lower than in 1869 by diseases of the respiratory system, chiefly bronchitis, by those of the digestive system especially hernia, by gonorrhœa in the diseases of the urinary, and by ulcers and boils in those of the cutaneous system; there was, however, a considerable increase in abscesses of the cellular tissue.

Injuries.—The admissions by accidental injuries were less than half the proportion of the preceding year. The only death in this class was suicidal by arsenic.

Surgical Operations.—The only one recorded was amputation of the thigh for necrosis of the femur and disease of the knee joint. The operation was performed in the upper third of the thigh and was successful.

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### SANITARY REPORT.

Staff Surgeon Hungerford, Senior Medical Officer at Jamaica, reports:—

There have been no epidemic diseases at any of the stations, nor has there been any disease especially prevalent, with the exception of venereal disease among the black troops at Up Park Camp and Port Royal.

With regard to the sanitary arrangements, the Medical Officer in charge at Up Park Camp has frequently complained of the inefficient state of the water-closets at that station. Repeated repairs have been carried out by the Royal Engineer Department. It seems to me, however, that the entire system should be altered, and the earth closet substituted for it.

The cubic space both at Up Park Camp and Port Royal is, in my opinion, insufficient; the allowance should not be less than 1,000 cubic feet, per man.

A bath is required at Port Royal. The men at present bathe in the sea, and although no accidents have occurred, still as there are always sharks in the

*Jamaica.* harbour, the expenditure of a little money in inclosing a bathing place seems to be required.

The general sanitary state of Newcastle has been fair. No changes of importance took place till the departure of the head-quarters of the 29th regiment for Barbados, after which the amount of cubic space, per man, became much increased. The new huts completed last summer have not been occupied, and the Royal Artillery Barracks have been vacated.

There have been no material improvements in drainage, which is in all cases superficial.

With regard to the prevention of venereal disease, there is at present no local ordinance, but I understand that the subject is under the consideration of the Government.

There are no special night ablution places.

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## III. Bahamas.

### STATISTICAL REPORT.

*Bahamas.* No deaths occurred among the European non-commissioned officers during the year.

The average strength of the black troops was 202, the admissions into hospital were 215, and the deaths were five. These numbers give the proportion of 1,064 admissions and 24·75 deaths per 1,000 of mean strength; both considerably lower than in the preceding year.

The following Table, from Abstract No. 15 in the Appendix, shows the admissions and deaths in the different classes of diseases:—

*Bahamas.*

| Order. | Black Troops. | Strength, 202. | | Annual Ratio per 1,000. 1870. | | 1869. | |
|---|---|---|---|---|---|---|---|
| | Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| | I. *General Diseases.* | | | | | | |
| 1 | Febrile Group .. .. | 19 | 1 | 94·0 | 4·95 | 520·4 | 9·41 |
| 2 | Constitutional „ .. .. | 73 | 2 | 361·3 | 9·90 | 181·5 | 15·67 |
| | II. *Local Diseases.* Diseases of the— | | | | | | |
| 1 | Nervous system .. .. | .. | .. | .. | .. | 22·0 | .. |
| 2 | Eye .. .. .. .. | 1 | .. | 5·0 | .. | 6·3 | .. |
| 5 | Circulatory system .. .. | 2 | 1 | 9·9 | 4·95 | .. | .. |
| 6 | Absorbent „ .. .. | 2 | .. | 9·9 | .. | 3·1 | .. |
| 8 | Respiratory „ .. .. | 18 | 1 | 89·1 | 4·95 | 75·2 | 3·13 |
| 9 | Digestive „ .. .. | 14 | .. | 69·3 | .. | 62·7 | 3·13 |
| 10 | Urinary „ .. .. | 38 | .. | 188·1 | .. | 166·1 | .. |
| 11 | Generative „ .. .. | 1 | .. | 5·0 | .. | 22·0 | .. |
| 12 | Organs of Locomotion .. | .. | .. | .. | .. | 3·1 | .. |
| 13 | Cellular Tissue .. .. | 2 | .. | 9·9 | .. | 12·5 | .. |
| 14 | Cutaneous system .. .. | 17 | .. | 84·1 | .. | 37·6 | .. |
| | III. *Conditions, &c.* Debility .. .. .. | 1 | .. | 5·0 | .. | 6·3 | .. |
| | IV. *Poisons* .. .. | 1 | .. | 5·0 | .. | 12·5 | .. |
| | V. *Injuries.* Accidental .. .. .. | 26 | .. | 128·7 | .. | 97·2 | 3·13 |
| | Total .. .. | 215 | 5 | 1064·3 | 24·75 | 1228·8 | 34·47 |
| | Average of 10 years 1860–69 | .. | .. | 958·4 | 25·65 | .. | .. |

The admissions have been one-tenth above and the deaths slightly below the average of the last ten years. Compared with the results for 1869 there has been a reduction of above an eighth in the admissions and nearly a-third in the deaths, the former almost exclusively in the febrile group, and the latter in both groups of general diseases.

In 1869 the admissions by paroxysmal fevers amounted to 498 per 1,000 of the strength, and in 1870 they were only 84 per 1,000. In the latter year there was a considerable increase in the amount of syphilis, the admissions by it amounting to 257 per 1,000 and having been only 125 in the preceding year. The decrease in the deaths was chiefly shown in fevers and consumption. The numbers under observation are so small that considerable fluctuations in the results must occur.

## IV. Honduras.

### STATISTICAL REPORT.

*Honduras.*

The average strength of European non-commissioned officers was three, among whom four cases of sickness, and no deaths occurred.

The average strength of the black troops was 183, the admissions into hospital were 219, and the deaths two. These numbers give the ratio of 1,197

*Honduras.* admissions and 10·92 deaths per 1,000 of mean strength, the former considerably above and the latter very much under the proportion in the preceding year.

The following Table, framed from Abstract No. 15 in the Appendix, shows the admissions and deaths by the different classes of diseases:—

| Order. | Black Troops. Diseases. | Strength, 183. Admitted. | Strength, 183. Died. | Annual Ratio per 1,000. 1870. Admitted. | 1870. Died. | 1869. Admitted. | 1869. Died. |
|---|---|---|---|---|---|---|---|
| | I. *General Diseases.* | | | | | | |
| 1 | Febrile Group.. .. | 84 | .. | 459·0 | .. | 144·4 | 5·55 |
| 2 | Constitutional „ .. .. | 21 | .. | 114·8 | .. | 133·3 | 5·55 |
| | II. *Local Diseases.* | | | | | | |
| | Diseases of the— | | | | | | |
| 1 | Nervous System .. .. | 4 | .. | 21·9 | .. | 16·7 | .. |
| 2 | Eye .. .. .. .. | 5 | .. | 27·3 | .. | 27·8 | .. |
| 3 | Ear .. .. .. .. | .. | .. | .. | .. | 5·6 | .. |
| 5 | Circulatory System .. .. | .. | .. | .. | .. | 16·7 | 5·55 |
| 6 | Absorbent „ .. .. | 4 | .. | 21·9 | .. | .. | .. |
| 8 | Respiratory „ .. .. | 2 | .. | 10·9 | .. | 50·0 | 5·55 |
| 9 | Digestive „ .. .. | 30 | .. | 163·9 | .. | 83·3 | 5·55 |
| 10 | Urinary „ .. .. | 25 | .. | 136·6 | .. | 66·7 | .. |
| 11 | Generative „ .. .. | 2 | .. | 10·9 | .. | 22·2 | .. |
| 12 | Organs of Locomotion .. | 3 | 1 | 16·4 | 5·46 | 16·7 | .. |
| 13 | Cellular Tissue .. .. | 4 | .. | 21·9 | .. | 33·3 | .. |
| 14 | Cutaneous System .. .. | 12 | .. | 65·5 | .. | 72·2 | .. |
| | V. *Injuries.* | | | | | | |
| 2 | Accidental .. .. .. | 23 | 1 | 125·7 | 5·46 | 122·2 | .. |
| | Total .. .. .. | 219 | 2 | 1196·7 | 10·92 | 811·1 | 27·75 |
| | Average of 10 Years, 1860–9 | .. | .. | 912·3 | 22·60 | .. | .. |

The increase in the admissions, compared with the amount in 1869, was chiefly due to remittent fever, which prevailed to a considerable extent in September, October, and November, the number of admissions by paroxysmal fevers in these three months having been equal to one-third of the force. There was a reduction in the amount of rheumatism, and syphilis was, as in the preceding year, a cause of very little inefficiency. None of the other diseases seem to require special notice, the variation in their prevalence having only been such as might be expected with the small numbers under observation.

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SANITARY REPORT.

Staff-Surgeon Hemphill reports:—

The troops do not appear to have suffered seriously in regard to health during the past year. Corosal was singularly healthy, while Belize and Orange Walk were not so,—chiefly in respect of the numbers admitted to hospital from fevers. The state of the barracks at Belize, on the edge of a large swamp, sufficiently accounts for the frequency of cases of this nature.

The vicinity of Orange Walk is also swampy, and covered with bush, and being well in the interior, is, to a certain extent, removed from the influence of the sea breezes. The ground for miles around Corosal is high and dry, and the district possesses the best climate that I know of within the tropics. Marsh fevers are comparatively few, and I believe the temperature is several degrees cooler than that of Belize. *Honduras.*

The climate of one (Corosal) may be described as dry, cool, and bracing, and that of the other (Belize) as damp, hot, and relaxing. I believe I am quite right in saying that the northern district, of which Corosal is the chief town, is the only one that necessitates the presence of troops in British Honduras: and, this being the case, it seems odd that the bulk of the troops should be concentrated at Belize. In last year's Return, I recommended that the head-quarters of the detachment should be stationed at Corosal, and my opinion in this respect has only been strengthened by further experience. Fort George was not occupied during any portion of the year, but it has always been a healthy station. It is situated to the eastward, and in the harbour of Belize, and can accommodate from 20 to 30 men. I would suggest the transfer of the head-quarters of this command to Corosal, leaving a small detachment at Fort George, say of 20 men under a subaltern officer, for three reasons:—

In the first place, Corosal is by far a healthier station than Belize, probably the healthiest in the colony. 2. The northern district is the only part of British Honduras in which disturbances can break out, the south and west being unassailable, and without hostile Indians on their borders; and, by having troops at Corosal, assistance could be promptly despatched to any part threatened with an Indian raid. 3. A considerable saving in regard to expenditure could be effected should my suggestion be adopted. The barracks at Belize are old, dilapidated, and straggling. All the buildings, including officers' quarters, &c., are very old, and such is their state of decay that to repair them efficiently is simply impossible. This is a subject on which much more might be said, but I may be travelling beyond my own province.

No improvements requiring remark have taken place, nor have any been urgently required. There is not any law with reference to venereal diseases, and I do not think that any is required, as the colony appears singularly free from complaints of this description.

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## *Section* II.

### *On the Extent of Invaliding.*

There were 14 invalids sent to England during the year from the Windward and Leeward Command, and 10 from Jamaica, and seven and six were finally discharged the Service of the invalids from these Commands respectively. These numbers give the proportions of 18·2 per 1,000 of the strength sent home from the former and 15·1 from the latter, and of 9·1 and 9·0 finally discharged the Service. Of the black troops serving in the West Indies and on the West Coast of Africa 25 were discharged as invalids, being in the ratio of 13·9 per 1,000 of the strength. *West Indies & West Africa.*

The disabilities of the invalids are stated in Abstract Nos. 14 and 15 in the Appendix, from which the following classified summary has been framed:—

*West Indies & West Africa.*

| | White Troops. | | | | Black Troops. |
|---|---|---|---|---|---|
| | Windward and Leeward Command. | Jamaica. | Windward and Leeward Command. | Jamaica. | West Indies and Western Africa. |
| Mean Strength .. .. | 769. | 663. | 769. | 663. | 1,795. |
| Classes of Disabilities .. | Invalids sent Home. | Invalids sent Home. | Discharged as Invalids at Netley. | Discharged as Invalids at Netley. | Discharged as Invalids in the Colonies |
| Ague .. .. .. .. | .. | 2 | .. | .. | .. |
| Rheumatism .. .. .. | .. | .. | .. | .. | 4 |
| Syphilis .. .. .. | 1 | 1 | 1 | 1 | 4 |
| Scrofula, Phthisis, &c. .. | 1 | 1 | 4 | 3 | 7 |
| Diseases of the— | | | | | |
| Nervous System .. .. | 1 | .. | .. | .. | .. |
| Eye .. .. .. .. | .. | 1 | .. | 1 | 1 |
| Ear .. .. .. .. | .. | .. | .. | .. | 1 |
| Circulatory System.. .. | .. | 1 | .. | 1 | .. |
| Respiratory „ .. .. | 6 | 2 | .. | .. | .. |
| Digestive „ .. .. | 1 | 1 | .. | .. | 1 |
| Urinary „ .. .. | 1 | .. | 1 | .. | .. |
| Generative „ .. .. | .. | .. | .. | .. | 1 |
| Organs of Locomotion .. | .. | .. | .. | .. | 3 |
| Cellular Tissue .. .. | .. | .. | .. | .. | 1 |
| Cutaneous System .. .. | 1 | .. | .. | .. | 2 |
| Debility .. .. .. | 1 | 1 | .. | .. | .. |
| Accidental Injuries .. .. | 1 | .. | 1 | .. | .. |
| Total .. .. | 14 | 10 | 7 | 6 | 25 |
| Ratio per 1,000 of Mean Strength .. 1870 .. | 18·2 | 15·1 | 9·1 | 9·0 | 13·9 |
| Mean Strength .. 1860-69 | 28·7 | 27·7 | 15·9 | 17·5 | 13·9 |

The proportion of men sent to England and of those finally discharged has been slightly under that of the preceding year, but considerably below the average of the last ten years. The proportion discharged of the black troops was exactly the average; scrofula and phthisis, syphilis and rheumatism were the principal disabilities among them.

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*Section* III.

*Mean Daily Sick.*

*West Indies.*

The average number constantly sick of the European troops in the Windward and Leeward Command was 31 and in Jamaica 16·3, being in the ratio of 40·31 and 20·92 per 1,000 of mean strength. Of the black troops the numbers daily sick were in the Windward and Leeward Command 20, in Jamaica 25, in Bahamas 16, and in Honduras 6·8. The following Table shows the proportion sick per 1,000 of mean strength, and the usual deductions as to mean sick time and average duration of cases:—

| | | White Troops. | | Black Troops. | | | |
|---|---|---|---|---|---|---|---|
| | | Windward and Leeward Command. | Jamaica. | Windward and Leeward Command. | Jamaica. | Bahamas. | Honduras. |
| Ratio per 1,000 constantly Sick. | 1870 .. | 40·31 | 20·92 | 43·86 | 48·45 | 79·21 | 37·16 |
| | 1860–69 .. | 48·03 | 40·70 | 47·96 | 64·91 | 50·88 | 34·21 |
| | | days. | days. | days. | days. | days. | days. |
| Mean sick time to each Soldier. | 1870 .. | 14·71 | 7·64 | 16·01 | 17·68 | 28·91 | 13·56 |
| | 1860–69 .. | 17·53 | 14·85 | 17·51 | 23·69 | 18·57 | 12·49 |
| Average duration of the Cases. | 1870 .. | 15·89 | 15·62 | 16·94 | 26·15 | 27·16 | 11·33 |
| | 1860–69 .. | 14·79 | 15·65 | 19·37 | 19·43 | 19·38 | 12·69 |

Among the white troops in the Windward and Leeward Command there has been a decrease in the mean daily sick and mean sick time to each soldier compared with the proportion in 1869, but the average duration of the cases has been almost identical in the two years. In Jamaica there has been a reduction of upwards of one-third of the proportion constantly sick, and of nearly four and a half days in the average duration of the cases compared with the results for 1869. It is impossible to say at present whether this is an accidental variation dependent on the reduced numbers under observation, or is due to the greater space in barracks and the increased accommodation resulting from the recent reduction of the force.

Among the black troops there has been an increase in the proportion constantly sick in the Windward and Leeward Command compared with the preceding year, though the ratio is still under the average of the last ten years. In Jamaica there has been a very marked decrease, but the ratio in 1869 was extremely high. There was also a great reduction in the mean sick time to each soldier, and the average duration of the cases was two and a half days less than in 1869. In the Bahamas there has been a marked increase in all these particulars, and at Honduras a slight increase in the mean sick and average sick time to each soldier, but a decrease in the duration of the cases.

# VI.—ON THE HEALTH OF THE TROOPS SERVING IN WESTERN AFRICA.

## *Section* I.

## *Sickness and Mortality.*

### STATISTICAL REPORT.

*Western Africa.*

A great reduction was made during the year in the force employed in Western Africa. In the end of May the Head-Quarters and three companies of the 1st West India Regiment left the Command for the West Indies. At the same time the force was withdrawn from the Gambia, and in June Lagos also was given up as a military station.

As the Gambia and Lagos were occupied during a portion of the year only, and that usually the more healthy period, it seems unnecessary to enter minutely into a detail of the sickness and mortality at them. It may be sufficient to state that at the Gambia in a force of about 120 men 44 cases of sickness and two deaths occurred before the end of May, the latter from phthisis; and that at Lagos in a strength of 66 men there were 21 admissions and no deaths during the first quarter of the year.

The admissions into hospital and deaths at Sierra Leone and the Gold Coast during the year were as follows:—

| | Average Strength. | Admissions into Hospital. | Deaths | Ratio per 1,000 of Strength. | | 1860–9. Ratio per 1,000. | |
|---|---|---|---|---|---|---|---|
| | | | | Admitted | Died. | Admitted | Died. |
| Sierra Leone .. | 229 | 231 | 5 | 1,009 | 21·83 | 1,059 | 30·56 |
| The Gold Coast.. | 209 | 211 | 4 | 1,010 | 19·14 | 1,429 | 47·08 |

At Sierra Leone the admissions were slightly and the deaths one-third under the average of the preceding ten years. On the Gold Coast the admissions were very much and the deaths more than one-half below the average.

The diseases by which the sickness and mortality were caused are stated in detail in Abstract No. 16 in the Appendix; the results are shown in the following Table:—

| Orders. | Diseases. | Sierra Leone. 1870. Mean Strength 229. Admitted. | Died. | Ratio per 1,000. Admitted. | Died. | 1869. Ratio per 1,000. Admitted. | Died. | The Gold Coast. 1870. Mean Strength 209. Admitted. | Died. | Ratio per 1,000. Admitted. | Died. | 1869. Ratio per 1,000. Admitte d. | Died. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | I. *General Diseases.* | | | | | | | | | | | | |
| 1 | Febrile.. Group.. | 62 | .. | 270·8 | .. | 93·9 | .. | 58 | .. | 277·5 | .. | 84·2 | 3·51 |
| 2 | Constitutional ,, .. | 55 | 2 | 240·2 | 8·73 | 454·5 | 12·12 | 34 | .. | 162·7 | .. | 175·4 | 3·51 |
| | II. *Local Diseases.* Diseases of the— | | | | | | | | | | | | |
| 1 | Nervous System .. | 1 | .. | 4·4 | .. | 9·1 | .. | 7 | 2 | 33·5 | 9·56 | 3·5 | .. |
| 2 | Eye .. .. .. | 6 | .. | 26·2 | .. | 6·0 | .. | 6 | .. | 28·7 | .. | 24·6 | .. |
| 3 | Ear .. .. .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 3·5 | .. |
| 5 | Circulatory System.. | 2 | .. | 8·7 | .. | .. | .. | 1 | 1 | 4·8 | 4·79 | 3·5 | .. |
| 6 | Absorbent ,, .. | 2 | .. | 8·7 | .. | 9·1 | .. | 1 | .. | 4·8 | .. | 35·1 | .. |
| 8 | Respiratory ,, .. | 11 | 2 | 48·0 | 8·73 | 75·8 | 3·03 | 9 | 1 | 43·1 | 4·79 | 21·1 | .. |
| 9 | Digestive ,, .. | 8 | 1 | 34·9 | 4·37 | 145·5 | 3·03 | 26 | .. | 124·4 | .. | 129·8 | 7·02 |
| 10 | Urinary ,, .. | 40 | .. | 174·7 | .. | 142·4 | 6·06 | 32 | .. | 153·1 | .. | 87·7 | .. |
| 11 | Generative ,, .. | 3 | .. | 13·1 | .. | 15·2 | .. | 6 | .. | 28·7 | .. | 7·0 | .. |
| 12 | Organs of Locomotion | 3 | .. | 13·1 | .. | 30·3 | .. | 1 | .. | 4·8 | .. | 7·0 | 3·51 |
| 13 | Cellular Tissue .. | 3 | .. | 13·1 | .. | 24·2 | .. | 4 | .. | 19·1 | .. | 143·8 | 7·02 |
| 14 | Cutaneous System .. | 23 | .. | 100·5 | .. | 136·4 | .. | 14 | . | 67·0 | .. | 129·8 | .. |
| | III. *Conditions, &c.* Debility .. .. | .. | .. | .. | .. | 9·1 | .. | .. | .. | .. | .. | .. | .. |
| | IV. *Poisons* .. | .. | .. | .. | .. | 3·0 | .. | .. | .. | .. | .. | .. | .. |
| | V. *Injuries.* | | | | | | | | | | | | |
| 2 | Accidental .. .. | 12 | .. | 52·4 | .. | 124·2 | 3·03 | 12 | .. | 57·4 | .. | 98·2 | 3·51 |
| | Diseases not stated.. | .. | .. | .. | .. | 15·2 | .. | .. | .. | .. | .. | .. | .. |
| | Total.. .. | 231 | 5 | 1008·8 | 21·83 | 1293·9 | 27·27 | 211 | 4 | 1009·6 | 19·14 | 954·2 | 28·08 |
| | Average of 10 years 1860-9 .. .. | .. | .. | 1059·3 | 30·56 | .. | .. | .. | .. | 1429·4 | 47·08 | .. | .. |

There was a considerable increase at both stations, compared with the results for 1869, in the admissions by paroxysmal fevers, but they did not prove fatal in any case. There was also a considerable reduction in rheumatism, and at Sierra Leone in syphilis, but the latter disease was slightly more prevalent on the Gold Coast, and the same remark applies to gonorrhœa There were only two cases of guinea worm admitted into hospital, both on the Gold Coast. There was a considerable reduction in the admissions by ulcers, and in those by accidental injuries at both stations.

## SANITARY REPORT

### *Gambia.*

Staff Surgeon Thomas writes that, as his Report embraces but a broken period of five months, and as the troops have been finally withdrawn from this station, he has not furnished the usual topographical details. During these months the cesspits in the barrack and hospital compounds were filled in, earth utensils (emptied daily) being substituted. This change became a matter of pressing necessity, as the air and soil were contaminated, and the water in the well, yielding the best potable water on the island, was occasionally found to be fœtid. The ablution shed was also furnished with basins and tubs. The Settlement has fortunately been spared from a fresh outbreak of cholera this year. During the first quarter glandular swellings were very

*Western Africa.*

prevalent among both the civil population and the soldiers, although only three cases of mumps were admitted into hospital. Small-pox has been very prevalent among the black population in the Settlement and surrounding tribes. No private soldier suffered from this disease, but one white officer was attacked in April.

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*The Gold Coast.*

Staff Surgeon Mosse, the Principal Medical Officer at the Gold Coast, reports:—

"The roof of the east wing of the officers' quarters continues in a very "unsatisfactory condition. During the rains the quarters in this wing have "been completely saturated with moisture; their occupation under such circum- "stance was injurious, and calculated to increase the sick rate of the occupants. "The temporary repairs availed but little (and that little only for a very limited "time) in the prevention of leakage." Staff Surgeon Mosse refers to the remarks made by him on this head in his annual Sanitary Report for 1868, and strongly urges the inexpediency of allowing officers to occupy these quarters during the rains. "Since the departure of the detachment, 1st West "Indian Regiment, for the West Indies in August, increased cubical space has "been available for the use of the troops in this garrison, leaving nothing to "be desired under that head, either in barracks or hospital, the accommodation "being more than sufficient for the present strength. The drainage and "sanitary condition of the immediate vicinity of the castle have been greatly "improved. The colonial authorities have manifested a desire to rectify, "as far as practicable, the hitherto very insanitary condition of the native "town, and have already carried out many decided improvements."

No special Act of Parliament, local ordinance, or law exists for the prevention of venereal diseases. No special facilities exist for private ablutions at night. Venereal diseases always furnish a large percentage of the sick rate.

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*Section* II.

*Invaliding.*

The extent of invaliding has already been shown under that section of the Report on the West Indies.

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*Section* III.

*Mean Daily Sick.*

The mean daily sick at Sierra Leone was 13, and on the Gold Coast 8·2, being respectively in the ratio of 56·77 and 39·23 per 1,000 of mean strength, both, but especially the latter, being under the proportion in the preceding year. The following Table gives the usual deductions on this subject:—

| | | Sierra Leone. | The Gold Coast. |
|---|---|---|---|
| Ratio per 1,000 constantly sick .. .. | 1870 | 56·77 | 39·23 |
| | 1860–9 | 47·34 | 61·95 |
| | | days. | days. |
| Average sick time to each soldier .. .. | 1870 | 20·72 | 14·32 |
| | 1860–9 | 17·28 | 22·61 |
| Average duration of cases of sickness .. | 1870 | 20·54 | 14·18 |
| | 1860–9 | 16·31 | 14·60 |

The mean sick at Sierra Leone was considerably above, and on the Gold Coast considerably below, the average of the preceding ten years, but the numbers now under observation are so small as to lead us to expect great fluctuations. The reduction on the Gold Coast may probably be in a large measure due to the withdrawal of the troops from Lagos, where the proportion of sick was always very high.

# VII.—ON THE HEALTH OF THE TROOPS SERVING AT THE CAPE OF GOOD HOPE AND ST. HELENA.

## *Section* I.

## *Sickness and Mortality.*

### STATISTICAL REPORT.

*Cape of Good Hope and St. Helena.*

In June a Battery of the Royal Artillery left the Cape for Mauritius, and another for England. Two Companies and a half of Royal Engineers were withdrawn from the Command during the year, and the 1st Battalion 9th Regiment and the 2nd Battalion 11th embarked for England, the latter in June and the former in July. In the end of May also the Cape Mounted Rifle Regiment was disbanded.

The average strength of the troops during the year, at the Cape and St. Helena, was 2,941; the admissions into hospital were 3,253, and the deaths, 37, to which must be added 4 among the invalids, making a total of 41. The admissions therefore were in the ratio of 1,106, and the deaths of 13·94 per 1,000 of mean strength; the former being under, and the latter 2·25 per 1,000 above the average of the preceding year.

The following Table, framed from Abstract No. 17 in the Appendix, shows the influence of the different classes of diseases on the sickness and mortality:—

*Cape of Good Hope and St. Helena.*

| Order. | Diseases. | 1870. Mean Strength, 2,941. Admitted. | Deaths. In Command. | Deaths. Of Invalids. | Deaths. Total. | Ratio per 1,000 of Strength. Admitted. | Ratio per 1,000 of Strength. Died. | 1869. Annual Ratio per 1,000 of Strength. Admitted. | 1869. Annual Ratio per 1,000 of Strength. Died. |
|---|---|---|---|---|---|---|---|---|---|
| | I. *General Diseases.* | | | | | | | | |
| 1 | Febrile Group .. | 296 | 3 | 1 | 4 | 100·6 | 1·36 | 104·6 | ·45 |
| 2 | Constitutional „ .. | 636 | 11 | 2 | 13 | 216·3 | 4·42 | 222·0 | 2·92 |
| | II. *Local Diseases.* | | | | | | | | |
| | Diseases of the— | | | | | | | | |
| 1 | Nervous system .. .. | 38 | 2 | 1 | 3 | 12·9 | 1·02 | 13·3 | 1·57 |
| 2 | Eye .. .. .. | 131 | .. | .. | .. | 44·6 | .. | 49·5 | .. |
| 3 | Ear .. .. .. | 13 | .. | .. | .. | 4·4 | .. | 2·9 | .. |
| 5 | Circulatory system .. | 43 | 4 | .. | 4 | 14·6 | 1·36 | 8·8 | 1·12 |
| 6 | Absorbent „ .. | 54 | .. | .. | .. | 18·4 | .. | 12·8 | .. |
| 8 | Respiratory „ .. | 125 | 1 | .. | 1 | 42·5 | ·34 | 43·6 | ·67 |
| 9 | Digestive „ .. | 359 | 5 | .. | 5 | 122·1 | 1·70 | 151·3 | 2·92 |
| 10 | Urinary „ .. | 712 | .. | .. | .. | 242·1 | .. | 215·4 | ·23 |
| 11 | Generative „ .. | 49 | .. | .. | .. | 16·7 | .. | 16·4 | .. |
| 12 | Organs of Locomotion .. | 17 | 1 | .. | 1 | 5·7 | ·34 | 4·9 | .. |
| 13 | Cellular Tissue .. .. | 68 | .. | .. | .. | 23·1 | .. | 28·8 | .. |
| 14 | Cutaneous system .. | 269 | .. | .. | .. | 91·5 | .. | 98·5 | .. |
| | III. *Conditions, &c.* | | | | | | | | |
| | Debility .. .. .. | 32 | 1 | .. | 1 | 10·9 | ·34 | 8·5 | .. |
| | IV. *Poisons* .. | 29 | 3 | .. | 3 | 9·9 | 1·02 | 13·9 | ·23 |
| | V. *Injuries.* | | | | | | | | |
| 2 | Accidental .. .. | 373 | 5 | .. | 5 | 126·8 | 1·70 | 150·7 | 1·12 |
| 3 | Homicidal .. .. | .. | .. | .. | .. | .. | .. | .. | ·23 |
| 4 | Self-inflicted .. .. | 1 | 1 | .. | 1 | ·3 | ·34 | ·7 | ·23 |
| | VI. *Surgical Operations* | 2 | .. | .. | .. | ·7 | .. | ·7 | .. |
| | No appreciable disease .. | 6 | .. | .. | .. | 2·0 | .. | ·7 | .. |
| | Total .. .. | 3,253 | 37 | 4 | 41 | 1106·1 | 13·94 | 1148·0 | 11·69 |
| | Average of 10 years, 1860-9 | .. | .. | .. | .. | 973·8 | 10·78 | .. | .. |

GENERAL DISEASES.—The admissions by both the febrile and the constitutional group were slightly lower than in the preceding year, but the deaths were higher. The admissions and deaths by the principal diseases comprised in this class were as follows :—

*Cape of Good Hope and St. Helena.*

| General Diseases. | Admitted | Died. | Annual Ratio per 1,000 of Strength. 1870. Admitted | 1870. Died. | 1869. Admitted | 1869. Died. |
|---|---|---|---|---|---|---|
| *Febrile—* | | | | | | |
| Eruptive Fevers .. .. | 4 | .. | 1·4 | .. | 7 | .. |
| Continued „ .. .. | 148 | 3 | 50·3 | 1·02 | 65·0 | .. |
| Paroxysmal „ .. .. | 126 | 1 | 42·8 | ·34 | 24·1 | ·22 |
| Influenza .. .. .. | 11 | .. | 3·7 | .. | 10·8 | .. |
| Erysipelas .. .. .. | 4 | .. | 1·4 | .. | 3·8 | ·22 |
| Other Diseases of this group .. | 3 | .. | 1·0 | .. | 2 | .. |
| *Constitutional—* | | | | | | |
| Rheumatism .. .. .. | ·133 | .. | 45·2 | .. | 44·1 | ·22 |
| Syphilis .. .. .. .. | 459 | 1 | 156·1 | ·34 | 166·4 | ·22 |
| Scrofula, Phthisis, &c. .. .. | 39 | 12 | 13·3 | 4·08 | 10·1 | 2·48 |
| Anæmia .. .. .. .. | 2 | .. | ·7 | .. | ·7 | .. |
| Other Diseases of this group .. | 3 | .. | 1·0 | .. | ·7 | .. |

*Continued fevers* were less prevalent than in the preceding year, but the ratio of admissions by *Paroxysmal fevers* was nearly doubled. The increase was mainly due to the number of cases which occurred in the 86th Regiment, and had been contracted at Mauritius, 60 of the 126 having been admitted from the head-quarters of that corps alone after its arrival in the Command.

There was a decrease in the admissions by syphilis of 10 per 1,000, but that disease is still a great source of inefficiency among the troops, the admissions by it having amounted to nearly one-sixth of the strength.

The admissions and deaths by *Scrofula and Phthisis* were considerably higher than in the preceding year, but this is probably an accidental variation.

Diseases of the circulatory system were more prevalent and fatal than in 1869. Twenty-seven cases were returned under the head of palpitation, chiefly in the 86th Regiment, and probably the result of the anæmic condition of the men from malarious fever in Mauritius.

*Diseases of the Urinary System* show an increase of 27 per 1,000, chiefly attributable to the greater prevalence of gonorrhœa.

Poisons.—There was a reduction in the amount of delirium tremens, and there were no deaths from it; but there were three deaths from excessive intoxication, two in the 2nd Battalion 11th Regiment at Cape Town and Wynberg, and one in the 32nd Regiment at Port Elizabeth.

The other classes of diseases do not require special remark.

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### SANITARY REPORT.

Deputy Inspector-General Grant reports :—

The health of the troops does not appear to have been injuriously affected by any special causes.

The prominent sanitary defects at Cape Town are the general state of the castle ditch, which, unfortunately, has been allowed to be made an outlet for part of the surface drainage of the town, and the filthy state of the streets immediately adjoining the main barracks. The neighbourhood of the hospital is also very offensive from a town drain which empties itself on the beach, and from the accumulation of seaweed which emits a foul stench as it decays.

I think it very desirable that the hospital grounds should be enclosed with a strong palisade. The front of the building is much exposed to glare.

This was provided for in the original construction by outside venetian shutters; but these, like the gates, have rotted and fallen off, and they have not been replaced, although the need of them, for the comfort of both patients and Medical Officers quartered on the premises has been represented. *Cape of Good Hope and St. Helena.*

The sanitary improvements which have been made during the year consist of the erection of one of Captain Warren's cooking ranges in the castle and main barracks, for the use of the Royal Artillery and Infantry respectively; the cook-houses in the main barrack have also been lengthened and better ventilated.

No change has taken place in the rations. The meat is very poor, and as it is also cheap, an additional ½ lb. weight to the ration would not cost much, and would not do more than make it equal in nutriment to that used at home.

The clothing is suitable to the different seasons. A Contagious Diseases Act passed by the Colonial Parliament has been in force at Cape Town, Graham's Town, and King William's Town, and Lock Hospitals have been established at these stations. The result, as far as the military are concerned, has not been satisfactory, no appreciable impression having been made on the disease. This may have been caused by the class of women with whom soldiers associate not being subjected to adequate police supervision. There is a strong political agitation going on against the Act, and the question of its continuance will probably be soon discussed in Parliament.

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## *Section* II.

### *On the Extent of Invaliding.*

There were 106 invalids sent to England during the year from the Cape and St. Helena, and 64 finally discharged the service at Netley, being respectively in the ratio of 36·04 and 21·76 per 1,000 of mean strength. The following Table, framed from Abstract No. 18 in the Appendix, shows the influence of the several classes of disabilities on the invaliding:—

*Cape of Good Hope and St. Helena.*

| Disabilities. | Invalids sent to England from Cape and St. Helena. | Invalids Discharged the Service. | |
|---|---|---|---|
| | | At the Cape. | At Netley. |
| Continued Fever .. .. .. .. | 1 | .. | .. |
| Ague .. .. .. .. .. | 1 | .. | .. |
| Rheumatism .. .. .. .. | 7 | .. | 3 |
| Syphilis .. .. .. .. .. | 10 | .. | 7 |
| Scrofula, Phthisis, &c. .. .. .. | 15 | .. | 16 |
| Diseases of the— | | | |
| Nervous System .. .. .. | 10 | .. | 3 |
| Eye .. .. .. .. .. | 3 | .. | 2 |
| Circulatory System .. .. .. | 7 | .. | 6 |
| Respiratory „ .. .. .. | 6 | .. | 1 |
| Digestive „ .. .. .. | 22 | .. | 16 |
| Urinary „ .. .. .. | 4 | .. | 1 |
| Generative „ .. .. .. | 1 | .. | .. |
| Locomotive „ .. .. .. | 4 | .. | 2 |
| Cutaneous „ .. .. .. | 4 | .. | .. |
| General Debility .. .. .. .. | 4 | .. | 3 |
| Accidental Injuries .. .. .. | 7 | .. | 1 |
| Surgical operations .. .. .. | .. | .. | 3 |
| Total .. .. .. | 106 | .. | 64 |
| Ratio per 1,000 of Mean Strength .. .. 1870 .. | 36·04 | .. | 21·76 |
| Ratio per 1,000 of Mean Strength .. .. 1860-9 .. | 29·31 | 1·54 | 20·37 |

The invaliding was considerably above the average of the preceding ten years; the proportion on account of diseases of the digestive system was unusually high, but this was due to 10 men having been invalided from the 20th Regiment for hepatic disease, in anticipation of the Regiment embarking for Mauritius, the climate of which station was considered to be unsuitable for such cases. The number finally discharged the Service was exactly the average. Phthisis and diseases of the digestive system furnished half the cases discharged.

## *Section* III.

### *Mean Daily Sick.*

The average number constantly sick during the year was 136, or 46·24 per 1,000 of mean strength. The following Table shows the usual deductions calculated on these numbers:—

| | 1870. | 1860-69. |
|---|---|---|
| Ratio per 1,000 of Strength constantly Sick.. .. .. | 46·24 | 50·24 |
| | days. | days. |
| Average Sick time to each Soldier .. .. .. .. | 16·88 | 18·34 |
| Average duration of cases of Sickness .. .. .. | 15·26 | 18·83 |

The mean daily sick has been 5 per 1,000 lower than in the preceding year, and there has been a reduction of two days in the average sick time to each soldier, and of rather over one day in the average duration of the cases. In all these particulars the ratio has been under the average of the preceding ten years. *Cape of Good Hope and St. Helena.*

## *Section* IV.

### *Influence of Age on the Mortality.*

Owing to the withdrawal of a large portion of the force and the change of several of the other regiments, the data available on this head are confined to the returns of two batteries of Royal Artillery and the 32nd Regiment. The ages of the men serving in them, and the deaths at each, are shown in the following Table :—

| | Under 20. | | 20 and under 25. | | 25 and under 30. | | 30 and under 35. | | 35 and under 40. | | 40 and upwards. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. |
| Royal Artillery ... ... ... | 10 | ... | 58 | ... | 64 | 2 | 56 | 4 | 31 | ... | 5 | ... |
| 32nd Regiment ... ... ... | 59 | ... | 229 | 4 | 259 | 1 | 87 | 2 | 33 | ... | ... | ... |
| Total ... ... | 69 | ... | 287 | 4 | 323 | 3 | 143 | 6 | 64 | ... | 5 | ... |
| Ratio per 1,000 of Mean Strength ... 1870 ... | ... | | 13·93 | | 9·28 | | 41·96 | | .. | | ... | |
| Ratio per 1,000 of Mean Strength ... 1860–9 | 3·05 | | 7·34 | | 10·77 | | 15·74 | | 19·39 | | 35·85 | |

The results for the ten years, 1860–9, do not differ materially from those for troops serving at home. They are slightly higher than those for Regiments and lower than those for the Depôts, and there is no very marked increase with the advance of age.

# VIII.—ON THE HEALTH OF THE TROOPS SERVING IN THE ISLAND OF MAURITIUS.

## *Section* I.

## *Sickness and Mortality.*

### STATISTICAL REPORT.

*Mauritius.* On the 8th of July the 2nd Battalion 20th Regiment arrived from the Cape of Good Hope, and with it detachments of Royal Artillery and Royal Engineers; on the 13th, the Head Quarters of the 86th Regiment, with small detachments of Artillery and Engineers, embarked for the Cape; and on the 21st December the left wing of the 20th returned to the same Command.

The average strength of the troops during the year was 665; the admissions into hospital from them were 753, and the deaths were 11, including 4 among invalids on their passage home and at Netley. These numbers give the proportion of 1,132 admissions and 16·56 deaths per 1,000 of mean strength, the former very much under and the latter 3 per 1,000 above the ratio of the preceding year.

The following Table framed from Abstract No. 17 in the Appendix shows the influence of the different classes of disease on the sickness and mortality:—

| Order. | Diseases. | Strength 665. | | | | 1870. | | 1869. | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Died. | | | Ratio per 1,000. | | Ratio per 1,000. | |
| | | Admitted. | At Mauritius. | Of Invalids. | Total. | Admitted. | Died. | Admitted. | Died. |
| | I. *General Diseases.* | | | | | | | | |
| 1 | Febrile Group .. | 290 | 2 | 1 | 3 | 436·1 | 4·51 | 1247·9 | 5·09 |
| 2 | Constitutional „ .. | 79 | 2 | 2 | 4 | 118·8 | 6·02 | 135·8 | 1·70 |
| | II. *Local Diseases.* | | | | | | | | |
| | Diseases of the— | | | | | | | | |
| 1 | Nervous System .. | 5 | 1 | .. | 1 | 7·5 | 1·50 | 10·2 | .. |
| 2 | Eye .. .. .. | 13 | .. | .. | .. | 19·5 | .. | 15·3 | .. |
| 3 | Ear .. .. .. | 2 | .. | .. | .. | 3·0 | .. | 6·8 | .. |
| 5 | Circulatory System .. | 3 | .. | 1 | 1 | 4·5 | 1·50 | 13·6 | 1·70 |
| 6 | Absorbent „ .. | 11 | .. | .. | .. | 16·6 | .. | 5·1 | .. |
| 8 | Respiratory „ .. | 24 | .. | .. | .. | 36·1 | .. | 66·2 | 1·70 |
| 9 | Digestive „ .. | 115 | .. | .. | .. | 172·9 | .. | 273·3 | 1·70 |
| 10 | Urinary „ .. | 51 | .. | .. | .. | 76·7 | .. | 83·2 | .. |
| 11 | Generative „ .. | 11 | .. | .. | .. | 16·6 | .. | 8·5 | .. |
| 12 | Organs of Locomotion .. | 1 | .. | .. | .. | 1·5 | .. | 6·8 | .. |
| 13 | Cellular Tissue .. .. | 11 | .. | .. | .. | 16·6 | .. | 20·4 | .. |
| 14 | Cutaneous System .. | 52 | .. | .. | .. | 78·2 | .. | 64·5 | .. |
| | III. *Conditions, &c.* | | | | | | | | |
| | Debility .. .. .. | 2 | .. | .. | .. | 3·0 | .. | 1·7 | .. |
| | IV. *Poisons* .. | 24 | 2 | .. | 2 | 36·1 | 3·01 | 23·7 | 1·70 |
| | V. *Injuries.* | | | | | | | | |
| 2 | Accidental .. .. | 59 | .. | .. | .. | 88·7 | .. | 73·0 | .. |
| | Total .. .. | 753 | 7 | 4 | 11 | 1132·4 | 16·54 | 2056·0 | 13·59 |
| | Average of 10 years, 1860–9 .. .. | .. | .. | .. | .. | 1060·6 | 20·74 | .. | .. |

The ratio of admissions, though so much lower than in 1869, was still above, but that of the deaths was below, the average of the last ten years. The decrease in the admissions compared with the preceding year was chiefly in the febrile group of general diseases, but also in diseases of the digestive system.

GENERAL DISEASES.—The diseases constituting the febrile group were little more than one-third as prevalent as in 1869, but with a very slight reduction in the deaths. Those of the constitutional group were less prevalent but much more fatal than in that year. The following Table shows the influence of the principal diseases in this class :—

*Mauritius.*

| General Diseases. | Admitted | Died. | Ratio per 1,000 of Mean Strength. 1870. Admitted | 1870. Died. | 1869. Admitted | 1869. Died. |
|---|---|---|---|---|---|---|
| *Febrile—* | | | | | | |
| Continued Fevers .. .. | 30 | .. | 45·1 | .. | 13·6 | .. |
| Paroxysmal „ .. .. .. | 258 | 3 | 388·0 | 4·51 | 1222·4 | 3·40 |
| Influenza.. .. .. .. | 2 | .. | 3·0 | .. | 6·8 | .. |
| Erysipelas .. .. .. | .. | .. | .. | .. | 3·4 | .. |
| Other Diseases of this Group .. | .. | .. | .. | .. | 1·7 | 1·70 |
| *Constitutional—* | | | | | | |
| Rheumatism .. .. .. | 23 | .. | 34·6 | .. | 33·9 | .. |
| Syphilis .. .. .. .. | 45 | .. | 67·7 | .. | 59·4 | .. |
| Scrofula, Phthisis, &c. .. .. | 7 | 4 | 10·5 | 6·02 | 17·0 | 1·70 |
| Anæmia .. .. .. .. | 4 | .. | 6·0 | .. | 25·5 | .. |

There has been an increase in the amount of *continued*, but a very marked decrease in *paroxysmal fevers*, compared with the results for 1869. The reduction, however, was to a great extent due to the change of the troops in July, when the 86th Regiment was replaced by the 20th from the Cape, and the detachments of Artillery and Engineers were relieved in like manner. The effect of this may be judged by the circumstance that 253 admissions by *paroxysmal fevers* occurred prior, and only 3 subsequent to the exchange, being respectively in the *annual* ratio of 875, and 8 per 1,000 of the mean strengths of the two different periods. There was a slight increase in the amount of *syphilis* and decrease in *scrofula and phthisis*, but the mortality by the latter was considerably above the average. The admissions for *anæmia* were only one-fourth of the proportion in the preceding year, a result probably of the change of the troops, the disease having been in most instances a sequel of malarious fever.

Local Diseases.—The most marked reduction in these was in *diseases of the digestive system*, chiefly in dysentery and hepatitis, and, as in the instances already noticed, was probably the result of the garrison during the latter half of the year being composed of troops who had not become saturated with malaria.

Poisons.—Twelve cases and two deaths were the result of delirium tremens; the other 12 cases returned under the head of alcoholic poisoning were probably cases of intemperance. The 86th Regiment furnished 8 of the cases of *delirium tremens*.

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SANITARY REPORT.

Surgeon-Major Small, Principal Medical Officer at this station, reports:—

During the course of the past year the composition of the force serving in the Mauritius has been changed by the arrival, on the 10th July, of the 2nd Battalion, 20th Regiment, from the Cape and Natal, with detachments of Royal Artillery and Royal Engineers, and the departure of the 86th Regiment on the 13th of the same month. A further change took place on the 21st October by the removal of a wing of the 2nd Battalion, 20th Regiment, consisting of 14 officers and 320 men for service at the Cape of Good Hope.

The present distribution of the force in the command is as follows:—headquarters 2nd Battalion, 20th Regiment, at Mahebourg, with detachments at the Citadel, Port Louis, and the Reduit; one company of Royal Artillery and one of Royal Engineers which, with the exception of a few men at the Citadel Mahebourg, and the Villa, garrison Fort George.

*Mauritius.*

During the first six months of the year 1870, that is, up to the beginning of July, when the old garrison quitted the island, malaria had been nearly the sole cause of sickness and invaliding among the troops in the command. Since that period, however, the health condition of the garrison has been good, and no admissions, due to malaria imbibed here, among the new comers have occurred.

The deductions to be drawn from this continued immunity among the troops from attacks of fever, from which many of the 2nd Battalion, 20th Regiment, had already suffered when in China, are that the disease may now be considered as endemic, and that the evolution of malaria either ceases altogether to be given off during our so-called cool season, which terminates at the end of October, or becomes so modified that a longer exposure to its influence is necessary before its effects are produced. Again, quinine as a prophylactic has been sedulously administered to all; from the experience thus gained as to the effects of quinine as antagonistic to malarial poisoning, I am of opinion that the fairly good health enjoyed by the troops in Port Louis up to the end of the year, the last two months of which form the beginning of our hot and unhealthy season, was in a great measure due to the administration of this drug, which, given daily in sufficiently large doses, such as four to six grains, appears entirely to prevent the recurrence of aguish attacks.

Staff Assistant-Surgeon O'Dwyer, who has taken quinine regularly for the last two years, has always escaped fever, though if the medicine be discontinued, or only a small dose (two to three grains) be taken, he does not consider himself safe from an attack, and the same may be said of many others.

For years past, and long before our present fever had become epidemic, the necessity for the erection of barracks in the upper, cooler, and healthier parts of the island had been brought prominently forward as the one important defect in the sanitary condition of the troops serving in this command. But as there does not appear any hope for the present, at least, of such buildings being constructed, it becomes a matter of importance for the well-being of the troops to make use of all available methods to prevent or arrest the destructive influence of malaria, to which they are subjected by residence on the sea-shore.

The first means which presents itself is the establishment of a hospital or sanatorium in the upper lands, where there is a cool, bracing climate during the summer months, and where immunity from malaria will be secured; for this purpose I would suggest the removal of the unoccupied wooden huts from Petite Rivière and such of the wooden buildings from Flacq and Grand River, S.E., as may be found suitable, as it is not likely, from their unhealthiness, that these posts will ever again be occupied. The first object of a hospital is, of course, to enable the sick to recover as speedily as possible, and to do so in the Mauritius the building must be situated in an open country with free circulation of air all round, good drainage, and far away from the malarious plains on the sea-board.

In my own experience of Port Louis Hospital, as well as that of the many Medical Officers, past and present, who have been attached to it, I have sometimes been necessitated to discharge men before they were quite cured, finding, from experience, that men long detained in hospital became anæmic, lost flesh and strength, although not admitted for malarious fever. In fact, since the appearance of malarious fever in the island, whatever disease causes the admission, all the sick have to get quinine regularly, otherwise they are certain to contract it.

Mauritius, during the hot and unhealthy season, is subject to hurricanes; tents, therefore, of which we have a goodly store, are of no avail unless placed near large buildings where shelter could at once be had during the continuance of one of these cyclones, as otherwise great destruction of property, and in all probability, considerable risks to life would be the inevitable result, as occurred at the encampment at Pointe D'Esny during the hurricane of 1868.

No part of the coast line is free from fever, and from the sea level to 800 feet above it, no one can be considered safe from its attacks. In these parts, the fever may be now said to make its appearance towards the end of

*Mauritius.* November, gradually increasing in intensity until the end of April (for first attacks), nearly disappearing about the middle of May, from which period, until the end of October, I conceive the Line Barracks in Port Louis and those at Mahebourg may, with safety, be occupied by troops.

*Flacq.*—For a long period this station has proved very unhealthy, and taking into account the low site upon which the barracks are built, the large quantity of organic matter carried down by the heavy rains and deposited at and around the post by the numerous streams that there enter the sea, also the close proximity of one of the largest rum distilleries in the island, the refuse from which is poured over a marsh many acres in extent, and there exposed to the rays of a tropical sun, I do not consider the military occupation of this post advisable or possible, as long as malarious fever continues endemic.

*Grand River, S.E.*—For reasons nearly similar, I consider the future occupation of this post unadvisable.

*Cannonier Point.*—The only other station which has been occupied by troops during the year, and which, during the force of the epidemic, was the only post on the sea coast apparently free from fever, has now, I regret to say, lost its former salubrity, many severe cases of malarious fever having been reported among the adults and children employed at the quarantine station.

*Mahebourg.*—The sanitary improvements completed and in progress at this station have been—the establishment of a system of scavengering, which is fairly well carried out, although there is room for improvement in some of the details. For some time past a good deal has been done for the surface drainage of the village, so that now in a very few places only does water accumulate after heavy or long continued rains. These surface drains are not paved and there is no supply of water to flush them. Again, as a rule, private premises are undrained. The water supply at Mahebourg has always been more or less defective, principally on account of neglect in keeping the canal in repair. A public lavatory is in course of erection. The slaughterhouse is about to be removed from its present objectionable site, and a sum has been voted for the establishment of public latrines.

The parts of Mahebourg where fever has most prevailed are those where rain-water accumulates, either from the natural configuration of the ground (and this cause has for the greater part been remedied) or from the neglect of drainage of court yards. The chief source of danger to the health of the troops at Mahebourg is the swamp on the shore close to the mouth of the La Chaux river. Much has been done within the past three years to render this swamp less dangerous; but a considerable amount of filling in is still necessary. Doubtless, when the new sanitary ordinance comes into operation and the sanitary authorities become possessed of an adequate revenue, much will be done to remedy the evils which still exist at this station.

*Mer Rouge.*—This extensive lagoon, having a superficies of nearly 400 acres, and lying between the coral sand island, upon which stands Fort George, and the town of Port Louis, though referred to in previous reports, deserves special reference on account of its important sanitary relations.

Until a small opening was made years ago in the causeway, which leads from the town to the fort, the tidal waters of the Mer Rouge were sluggish, in parts almost stagnant, unless stirred up by the floods of the Fanfaron, Latanier, and Terre Rouge rivulets which flow into it. In former times these were clear streams, but as Port Louis has increased much sewage matter and other filth has passed into them and been conveyed to the Mer Rouge, contributing, with the earth and silt carried down during floods, to the shallowing of the lagoon, and to the formation of extensive mud banks, especially at its S.E. end, and in the vicinity of Fort George.

That shallow lagoon and its mud flats, exposed to a great extent at low water and to a high temperature, early attracted attention as one of the great foci of malaria, and in 1867, on the urgent representation of Dr. Reid, Chief Medical Officer, and at the same time also Principal Medical Officer of the troops, a special commission was constituted, of which he was nominated President, and to which the Mayor, the Surveyor-General, the Commanding

Royal Engineer, the Harbour-Master, and others were nominated, in order to examine into the matter and suggest sanitary improvements.

Seeing that the locality did not admit of dredging, the Commission, *inter alia*, suggested the covering up of the mud flats with earth to be laid within retaining walls, and to be afterwards planted with trees; also, the shutting off from the Mer Rouge of the impurities and silt carried into it by the streams. These it was proposed to canalize and lead directly as regards the Lataniers and the Fanfaron into the eastern part of the harbour where dredging can be effected, and as concerns the Terre Rouge river, into the high sea by the Canal Anglais; it was also suggested that large openings should be made through the coral sand spit of Fort George and the Chaussee Tromelin, in order to ensure the frequent renewal by the sea of the waters of the Mer Rouge.

These works, though in considerable part failing to be done by the War Department, were recommended to be carried out at the expense of the Colonial Treasury and the Local Board of Health of Port Louis, the funds of the General Board of Health not being available, as they are raised by a sanitary rate in and for the rural districts only.

Except some minor operations nothing was done in 1867, and some work, begun by the Local Board of Health and the Government early in 1868, was much damaged by hurricane floods.

Nothwithstanding earnest and repeated recommendations on the part of the General Board of Health, the principal sanitary improvements of the Mer Rouge had made but little real progress until last year. The want of funds, doubts expressed as to the efficiency of some parts of the recommendations of the Mer Rouge Committee, which had been adopted and expanded by the General Board of Health, and apprehensions in respect of the employing prison labour for the purpose, appear to have been the chief causes of delay in executing these much needed improvements.

In July 1870 these works were really and comprehensively initiated, and have progressed very favourably, thanks to the energy of Major-General E. S. Smyth, at that time Acting Governor, who did not hesitate to take the responsibility of employing numerous gangs of convicts for the purpose; and they have been carried out thus far at comparatively little cost, and with no serious or permanent injury to the health of those employed. The Prison Committee, the Chief Medical Officer, the Surveyor-General, the Harbour Master, the Officer Commanding Royal Engineers at Fort George, and myself have all heartily aided in the operations, so far as concerned the Government and War Department, while in respect of those undertaken by the Local Board of Health, the Mayor of Port Louis has been indefatigable. A great deal has been accomplished, though much still remains to be done. The Fanfaron outfall into the Mer Rouge has been secured by retaining walls, and several acres of filthy mud at the S.E. angle of the lagoon have been effectually covered with earth, and are now being planted with trees. The canalization of the Lataniers stream is also being proceeded with, and the Local Board are covering in and planting much swamp land in its neighbourhood. In connection with those on the one hand and the harbour on the other, a large opening, 90 feet in width, has been made in the Chaussee Tromelin, in the vicinity of the only small opening (about 12 feet wide) before existing.

On the Fort George side several acres of muddy and noisome foreshore have been covered in with coral sand, old lime, and latterly with debris obtained from the demolition of an old work called Fort Abercrombie, from which much of the materials for the retaining walls have been obtained. The planting of that reclaimed land has not yet been commenced.

Two other important recommendations of the Mer Rouge Committee and General Board of Health have also been carried out in the vicinity of Fort George. One is the opening (100 feet wide) at its N.E. angle into the sea, through which part of the impurities of the lagoon flow out with ebb tide, and the water is renewed in a purer state by the flowing tide.

The other is the N.E. causeway, now being made at the joint expense of the General Board of Health and the Municipality of Port Louis. That work will shut out from the Mer Rouge the impure water of the Terre Rouge river,

*Mauritius.* direct them to the high sea, and increase their scouring effect when in flood to the benefit of the embouchure, and will serve as a means of conducting the filtered waters of the new abattoir through an iron pipe into a deep part of the Canal Anglais. The removal of the abattoir from its very objectionable site in the bed of the Lataniers river, which it polluted and so added to the mass of filth in the Mer Rouge, to a much superior site at the outer limit of the municipal boundary, is of itself a sanitary gain, not only as regards the great fever lagoon, but only also in a wider sense.

The North-Eastern Mer Rouge Chaussee is being so constructed as to isolate completely from that lagoon the Inodore establishments which, under the old system of management, contributed to its pollution.

Under the dry system of conservancy, however, which was initiated by the municipality towards the end of last year, there will be no possibility of a recurrence of that evil, if it be carried out strictly according to the regulations approved by Government for its management.

During 1870 there was also established by the Local Board, with the full concurrence of the General Board of Health, a culvert which permits the direct flow, into the head of the inner harbour, of the drainage waters of the Fanfaron stream and its affluents, and renders unnecessary the deep canal, cut for the most part through porous rock, and several thousand feet in length, whereby these waters used to pass to the Mer Rouge and contribute to its mud deposits.

In that channel also these deposits, subjected to a high temperature in the rocky passage, used to give off noxious emanations, while now only storm waters pass through it, the scouring effect of which, without a drawback, operates beneficially on the S.E. part of the Mer Rouge and parts adjoining, and the emanations from the canal, formerly so abundant and prejudicial to health, have ceased with their cause.

The deposit from these waters is made in a deep part of the Fanfaron harbour, where they lie innocuous until they accumulate in sufficient quantity to require dredging and removal, by lighters, two miles out to sea.

*Caudan.*—This part of the harbour, which is situated between the Royal Engineers establishments and the Royal Artillery barracks, and which had received the deposits from streams and drains for many years, leaving a large extent of fœtid mud exposed at low water and, forming the second great hot-bed of fever, was dredged during 1870. Nearly 85,000 tons of mud and silt were removed far out to sea from that inlet, and there is now within it an average depth of 10 feet of water. The foreshores of the War Department land adjoining it, which cannot be dredged much, need a retaining wall and filling in with earth, in order to complete that great sanitary improvement. The foreshores of Fort William and the adjoining marsh, also the property of the War Department, require to be filled in and planted, a proceeding represented to the authorities by my predecessor Dr. Reid in 1867, but without effect, no funds being made available by that Department for the purpose.

A project for the underground drainage of Port Louis, to include excreta and part of the storm rains, and to have its outfall on the shore in the vicinity of the town, has been almost universally condemned by the medical profession and the public for many weighty reasons, but chiefly on account of the certainty of reflux and the formation of sewage banks on the neighbouring shores and lagoons, where already there is too much organic matter laid up.

The Municipality having made arrangements for the better cleansing of the town, and for the disposal of the excreta on a uniform dry system by hand carriage and removal to a distance, it only remains, as regards drainage, to dispose of the house water and storm floods, in regard to which it may be added that a scheme for the improvement and extension of the surface drainage of Port Louis and its environs, and to include other sanitary improvements also, is at present under consideration of a committee of all the members of the General Board of Health, with the Chief Medical Officer as Chairman.

From that scheme, when worked out, much benefit to the hygienic interests of the town may reasonably be expected, and it is to be hoped

that no fresh difficulty will arise in regard to the funds necessary for its execution.

I take leave to add in conclusion, from an experience of very many years, that Port Louis has never, since I have known it, been so clean and so well looked after as at present, though in the lower parts of the town, just where barracks and hospitals are situated, the suburbs, the littoral, as well as elsewhere, much remains to be done for its sanitary improvements.

Owing to the long continued and indiscriminate destruction of the forests in the upper lands and denuding the lesser hills and river banks of their wood, the rain, instead of being absorbed and contained in the soil, at once runs off and subjects the lower lands to frequent inundations. For several years before the epidemic of malarious fever made its appearance there had been thus a steady accumulation, year after year, of organic *débris* brought down by the many streams which intersect the island, which, deposited at their mouths and on the low-lying level lands on the sea shore, gave rise, in 1866–67, to the production of malaria and to its present continuance.

As a means for the gradual replanting of the old forests and other lands in the island, the Colonial Government has introduced a new draft ordinance "for amending the laws relative to the conservation of woods, forest and "rivers, and for otherwise providing for the woods, forests, reserve lands, and "watercourses of this colony," which was published in the Government Gazette of 24th December, 1870, but, which will not probably come on for decision before the Council of Government before the months of April or May.

This draft has, for its principal object, to empower the Government of the colony to purchase woods and forests for the purpose of preserving the same, and also any lands to replant them with trees "for the purpose of better "securing a proper supply of water, or of better protecting the springs, "streams, rivers, and watercourses of this colony."

It is hardly necessary to dilate upon the importance of that power given to Government. For the last 20 years private speculation has stripped almost all the high lands of this small island of its central forests, from which took their rise all the watercourses that ran to the lower districts, at first the only ones in which sugar-cane was cultivated. To-day it may be said that the water of all the streams and rivers of this country is polluted at the very sources; there are sugar estates built at the central part of the island, there are Indian villages all along the course of these rivers, from their sources to their mouths, and it may be added that at Curepipe there is a town in formation,—which, before long, may become a populous one—on the banks of a large marsh, which is considered as one of the principal sources of the Plaines Wilhems River.

It is therefore highly necessary that the few forests which still exist, and the lands which are necessary to be replanted in order to protect our streams from a complete deprivation of water in times of drought, should henceforth be the property of Government.

It also contains provisions relative to the preservation of timber on lands already the property of Government, and the replanting of those lands, which it may be considered expedient to cover with wood.

The sea-shore reserves have, for many years past, been leased to neighbouring landowners who have planted them with a thick belt of Madagascar fir trees, in many parts 250 feet in width.

As to mountain reserves, it has long been a difficult question how to define these. The existing law says that no mountain shall be cleared above one-third from its base, meaning that the two-thirds of the slope of a mountain should be left wooded: but the practical difficulty was to determine what was the base of the mountain, and, in consequence, more than one mountain has been almost entirely cleared and shows its naked slopes, along which torrents run down during the heavy rains, and from which many springs that formerly existed have entirely disappeared. The draft ordinance to remedy that deficiency in the existing law proposes to define mountain reserves in the the following manner:—"Mountain reserves shall mean and include any "portion of ground lying on the slope of a mountain range and its spurs "within a horizontal distance of 600 feet from the ridge line." It is generally

*Mauritius.* supposed that the definition will, at all events, give rise to no practical difficulty, and in most cases it will provide for a sufficient protection to the springs that are found on the slopes of our hills, and preserve a large surface covered with trees, so as to keep a tolerable quantity of moisture in the surrounding atmosphere.

It is also proposed to replant the slopes of the Port Louis mountains, a measure much to be desired, for the high temperature in the principal town of the island must, to a certain degree, be attributed to the denuded slopes of the hills which nearly surround it, and in which the concentration and radiation of heat is so considerable.

Most of our streams and rivers have still a belt of trees 150 feet wide, but many of them are planted with canes to the very edge of the water. With a view to prevent the evaporation, but especially the pollution of the water, it is absolutely necessary that on each bank there should exist growing timber or brushwood of a certain width, otherwise, during the heavy rains, part of the earth of the adjacent cultivated land is carried into the stream with the manure and other impurities that may have been mixed with it, and for several days after repeated showers, the water is so polluted that it is not fit for household purposes.

It is also proposed, relative to marshes, from which a watercourse takes its rise, and to burying grounds, that they shall be surrounded with belts of trees 10 and 15 feet wide respectively. This measure, as well as many others of the same kind, with regard to the re-wooding of the island, had been recommended by the Fever Enquiry Commission in its report for 1868, and it will, without doubt, constitute a great sanitary improvement if carried out properly.

The general provisions of the draft propose that all unoccupied lands, the owner of which is not known, be planted with trees by Government, and that the Governor in Executive Council make regulations for the better execution of the provisions of the ordinance, as well as of laws already existing on the same subject.

Upon the whole, the proposed law will not be a bad one if strictly enforced by the officers who will be intrusted with its execution. There are provisions which propose to give a greater impulse to the administration of the woods and forests under the superintendence of the Surveyor-General of the colony, and if honest and competent men can be found as forest rangers it is to be hoped that public health will improve in a certain number of years, for there can be no doubt that the bad sanitary state of the island must be attributed in a great measure to the reckless destruction of forests, which has had for its immediate result a diminution in the quantity and a deterioration in the quality of the water consumed by the inhabitants of the lower portions of the districts, besides being, as I have already elsewhere stated, the cause of our present epidemic of malarious fever.

It is to be regretted that the framer of the new draft has not inserted therein certain provisions relative to the planting, as in India, of trees along the principal roads of the island, a clause which existed in a former draft now withdrawn. The number of trees would have been thereby increased by many thousands in the island, their shade would have been most beneficial to troops when marching, and to other travellers, who are now exposed during the day to the burning tropical sun, frequently without the chance of meeting a tree for miles, and, besides, the action of these rows of trees connecting the sea-shore reserves with the forests of the centre of the island would have been advantageous to the general temperature of all the districts. The Municipal Corporation of Port Louis have given on this subject a good example to the Local Government, for by its care the sides of all the principal roads in the outskirts of the town have been planted with trees, which are now of a certain height, and will in a few years constitute a great advantage to all who are necessitated to travel by them.

There is another point with regard to which the draft ordinance seems incomplete. It requires plantations of trees on the banks of those marshes alone which are the sources of rivers, but does not require such plantations for other marshes, which are numerous and which cannot, properly speaking, be considered as *apparent* sources of rivers, although there can be no doubt that,

they are the *non-apparent* sources of many streams and springs through subterranean channels so common in our volcanic island, they certainly ought to have been entitled to the same protection. There are besides in the same districts many marshes, which, being for the most part dry during a portion of the year, have contributed not a little to our present malarial condition, as this land saturated with water during the rainy season either by the rain itself or overflow from rivers or rivulets cannot, from its low level, be drained; these parts, therefore, on the coast line should be surrounded with a belt of trees, as was recommended by the Commission of 1868, of which I was a member.

I have considered it necessary to comment somewhat at length on this draft ordinance, being so convinced that the re-wooding of the old forest and other lands is the only means by which in time malaria will be stamped out, and the island regain its former salubrity.

To the establishment of a Contagious Diseases Act in the Mauritius there are so many local difficulties and objections, which the Colonial Government have considered insurmountable, that, with the exception of the setting apart of a few beds in the civil hospital for females labouring under venereal diseases, the matter seems to have dropped. I may add, that since these lock wards in the civil hospital were opened in December 1869 not one voluntary application for admission by females has been made.

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## Port Louis.

*Examination of Soil from Mauritius, obtained two feet below the surface from the immediate neighbourhood of the Line Barracks, Port Louis, by Francis H. Welch, Staff Assistant-Surgeon.*

Various specimens of soil were sent home by the Principal Medical Officer of the Mauritius. The soil, the examination of which is recorded in this paper, was collected by Dr. Walters. It was examined in the Hygiene Laboratory of the Royal Victoria Hospital.

I. *Physical Characters.*—General uniformity of structure, broken only here and there by small root fibres and angular whitish particles effervescing with hydrochloric acid (lime carbonate); component elements, fine, floculent, and suspending in water for a long period; colour, dark amber; of a dense firm consistence, and cohering strongly even when completely dry; aspect generally as of an alluvial soil, a mixture of marl, humus, and chalk.

(*a.*) *Permeability by Water.*—(Conducted on Pettenkoffer's method, only that instead of the soil being previously dried, it was taken in its ordinary state of humidity and placed in the burette under conditions of compactness and apposition of particles as closely approaching the soil *in situ* as possible.) Completely unpenetrable, even under the pressure of a column 12 inches in height and continued for 72 hours.

(*b.*) Absorption of water (3 grammes of perfectly dried pulverized soil were exposed under cover to the atmosphere for 24 hours, with a relative humidity 93, saturation 100°). An increase of weight ensued 31·5 per cent.

(*c.*) Chemical composition (25 grammes operated on).

Water and volatile substances (Fahrenheit 220°) 5·3985 or 21·59 per cent.

Organic matter (dried residue incinerated) ·689 grms., or 2·75 per cent.

| | | | |
|---|---|---|---|
| Iron .. .. .. .. | ·9781 grms. | or | 3·91 per cent. |
| Alumina .. .. .. | 5·1823 „ | | 20·72 „ |
| Lime (calculated as carbonate) | 5·8765 „ | | 23·50 „ |
| Magnesia „ „ | 1·5885 „ | | 6·35 „ |
| Silica and residue .. .. | 5·2855 „ | | 21·14 „ |
| | | | 99·96 |

(*d.*) Microscopic examination (350 diameters). Large and frequent masses of vegetable tissue, woody fibre, cellular element, fragments and shreds;

*Mauritius.* large spore cases; elongated oval cells with a series of secondary cells enclosed $\frac{1}{300}$" long, $\frac{1}{1000}$" broad; spherical masses, opaque, $\frac{1}{1000}$" diameter, rapidly colouring dark brown with very dilute iodine, and delicate branched fibres (much resembling spore tubes), intermingled with angular and amorphous particles of earthy constituents.

Thus the main features of this soil may be summed up as,—uniformity of structure, great capability of absorbing and retaining moisture, great compactness of texture—preventing permeation of fluids under its natural conditions and the amount of iron, marl, and vegetable debris in its composition.

II. The nature of the water for drinking or other purposes derived from this soil, as elucidated by the effects of commingling a portion of the same with distilled water.

Ten grammes of earth were well triturated with one litre of pure distilled water, and allowed to stand for three days in a tall glass for subsidence. At the end of this period there was a clear upper stratum, one-third of height of column, a middle milky turbid portion from suspension of fine floculent earthy material, with difficulty eliminated even by filtration, and a thick sediment of the larger and coarser components. An analysis of the dissolved constituents gave the following results.

(*a.*) Reaction slightly acid, taste rough; qualitative tests for the presence of chlorine, iron, alumina, nitrous and phospheric acid, gave no results; there were indications of lime, magnesia, sulphuric acid, nitric acid.

(*b.*) Total solids = ·175 grammes per litre, or 12·25 grains per gallon; of which inorganic = ·160 per litre or 11·2 grains per gallon, destructible by heat = ·015 per litre, or 1·05 grains per gallon.

(*c.*) Total hardness = 25 measures of soap solution = ·125 grammes per litre, or 8·75 grains per gallon.

Permanent hardness = 21 measures of soap solution = ·105 grammes per litre, or 7·35 grains per gallon.

Temporary hardness = 4 measures of soap solution = ·020 grammes per litre, or 1·40 grains per gallon.

(*d.*) Ingredients:—

| | | | | | |
|---|---|---|---|---|---|
| By Soap Test— | | | | | |
| Sulphuric Acid .. | = ·06 grms. | per litre, or .. .. | 4·2 grs. per gallon. | | |
| Lime .. .. .. | = ·042 „ | fixed salts ·039 / carbonate ·003 | or 2·94 | 2·78 fixed. / ·21 carbonate. | |
| Magnesia .. .. | = ·0114 „ | „ | ·98 | „ | |
| Free Carbonic Acid | = ·0132 „ | or ·279 cubic ins., or | ·924 grs. or 1·95 cubic ins. | | |
| Nitrates— | | | | | |
| Conversion into Ammonia and calculation from it.. .. .. | = ·02968 „ | .. .. .. .. or | 2·0776 | „ | |
| Total.. .. | ·15888 „ | .. .. .. .. or | 11·1216 | „ | |

Thus the water derivable from the soil may be summed up,—with difficulty freed from suspended earthy particles, small in the amount of the dissolved salts and organic matter, but excessive in proportion of earthy salts and permanent hardness, and containing no small indications of the prior presence of organic impurities in the soil, as revealed by the metamorphosed residue in water in the shape of nitrates.

III. *Remarks.*—The main interest in the examination of this earth is centred in its connexion with the severe epidemic of malarial fever during the years 1866, 1867, 1868, the poison of which, although perceptible among the community by the splenic and hepatic complications grafted on a bilious, remittent, or pseudo-continued fever as early as 1839, 1843, 1844 (Tessier, British Medical Journal for 1870, p. 699), did not assume a prominent character until the outbreak in 1866, commencing in a district, the soil of which is of the same nature as the specimen analysed. Agreeing also in this respect are the districts in which the fever arrived at its greatest intensity, namely,

in the western side of the island; flats intervening between the foot of hill ranges and the sea, the soil derived from the disintegration of the volcanic rocks of the high central volcanic plateau, often only a few feet above the sea level, with difficulty of drainage, and rivers permeating extremely sluggish. Around the Line Barracks, Port Louis (the district from which the specimen was taken), "the tenacious soil, uniform in character throughout whole depth, "varies from two to six feet in thickness, lying directly on the hard basaltic rock" (Small and Power, Blue Book, 1860, p. 446); and as the drainage is imperfect, presenting surface and subjacent configurations inimical to health and furnishing a favourable nidus for the aggregation of organic debris and their decomposition under a summer temperature. The comparative immunity of the island from malaria prior to 1866 forbid us regarding the soil in any other light than as one of the factors in the outbreak, furnishing a moist, impervious bed, upon which the organic materials brought down from the higher levels might become disseminated into the surrounding atmosphere with the evaporation of the surface-water during high temperature. Under the ordinary prevailing atmospheric conditions these low-lying, flat, tenacious levels are kept comparatively salubrious by the great rainfall washing away the surface impurities, the superfluous "surface water disappearing by "evaporation, there being scarcely any percolation" (Army Medical Blue Book, 1860, p. 446); thus a diminished rainfall and summer temperature furnish with the soil the requisite factors where vegetable or animal organic matter exists. "An extraordinary fall of rain and tremendous flood, carrying "down from the high level a mass of organic matter, followed by an exceptional "heat and drought (Tessier) preceded the epidemic, which continued localized "to the lower plains, occasionally creeping up ravines and river beds into "the hills." *Mauritius.*

It will be observed that vegetable organic matter was freely distributed throughout the specimen taken *two feet* below the surface, although no fungi were detected; the nature of the soil and country configuration would suggest that a nearer approach to the immediate surface exposure, and a careful microscopic examination of this layer and the supernatant air during the summer months might tend much to the confirmation or refutation of the supposed exciting cause of malaria in a vegetable fungus as set forth by Dr. Salisbury, probably not to be elucidated from soil having an intervening impervious portion of two feet.

It must be noted also that "a disturbance of large quantities of soil in the "making of railways and gasworks was also a feature preceding the outbreak, "while the exposure of mud from a large *barrachois* and its spread on the "land for manure witnessed the first commencement," and apparently determined its prior localization "10 miles from Port Louis for months anterior "to its subsequent spread over the island (Tessier)."

While the vegetable organic matter putrefying upon this most retentive soil, may be assumed as the malarial element, the accompanying animal organic debris derived from a dense increasing black and creole population fully explains the association of severe dysentery which so markedly accompanied the paroxysmal fever. With a soil of the nature of the specimen and an immediate subjacent hard rock characterizing the lower levels, an imperfect drainage, a diminishing rainfall, a rapidly increasing black population associated with extending sugar plantations on the slopes, and the outbreak of malarial fever and dysentery so pregnant of suggestion, the necessity for extreme sanitary measures is self-evident.

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### Mauritius.

*Examination (in the Hygienic Laboratory at Netley) of a specimen of Red Soil (Terre Rouge) from Mauritius, by R. Watson, M.D., Staff-Surgeon.*

The bottle which contained the sample of earth under examination had the following remarks attached:—

*Mauritius.* "No. 11. The ordinary red soil, *Terre rouge* of Mauritius taken from "Pamplemousses district close to the Moulin à Poudre, an old unoccupied "military station, distant about three miles from the sea. This soil is "generally met with all over the island, and is in the lower lands highly "malarious."

PHYSICAL CHARACTERS.

The "terre rouge," as its name implies, is an earthy soil of a darkish red colour, existing in the specimen examined principally in small pellets, or granular masses, which are very friable and easily reduced to a powder, which stains the finger or mortar. There is an admixture of decayed rootlets and vegetable matter. It is heavy, and rapidly subsides in water, leaving the supernatant fluid clear and colourless.

MICROSCOPIC CHARACTERS.

Examined by a low power (× 50) with concentrated light it presents the appearance of a granular powder of a blood red colour with a few crystals, both white and glistening black; the latter possibly fragments of horneblende or augite. When moistened, under the same power, the earth has a rugose honeycombed appearance. The supernatant fluid, examined with transmitted light (× 250), showed some minute impurities of vegetable *débris* and a few mineral particles.

Fifty grammes of the soil were exposed in a porcelain capsule to a temperature of 250° Fah. for one hour, when a loss of 3·14 grammes had taken place. After 24 hours at the same temperature the total loss of weight was 8·744 grammes, representing water and volatile matters to the amount of nearly 17½ per cent. This dried earth was then exposed for 24 hours in a thin layer on a dish, the air at the time being nearly saturated with moisture. Dry bulb of thermometer, 29°; wet bulb, 28°.5 Fah. 41·25 grammes of the dried soil had become 43·25 grammes, showing an increase of 2 grammes from the absorption of water from the atmosphere.

By incineration the earth turned first of a duller colour, but on cooling it became brighter red than before. Ten grammes kept at a red heat for some time lost 2·87 grammes in weight, or about 29 per cent.

To one litre of distilled water 100 grammes were added: this was allowed to stand in a temperature of 65° for 24 hours, and then filtered. The water was clear, inodorous, and had rather a saline taste.

The qualitative examination of this by the usual re-agents gave the following results:—

*Organic Matters.*—Four ounces boiled with solution of the chloride of gold produced a deep, dark purple colour, and a slight black precipitate at the end of 24 hours.

*Lime.*—By oxalate of ammonia. Nil.

*Chlorine.*—By sol. nit. argent. and nitric acid. A very faint milkiness.

*Phosphoric Acid.*—By molybdate of ammonia. Faint yellow tint.

*Nitric Acid.*—By brucine solution and sulphuric acid. Pink and yellow zones well marked.

*Nitrous Acid.*—By solution of starch and iodide of potassium with dilute sulphuric acid. A deep blue colour, developing somewhat slowly, and depositing a considerable precipitate.

*Ammonia.*—By Nessler's test. A very faint trace.

The tests for iron, lead, and sulphuretted hydrogen gave negative results.

QUANTITATIVE EXAMINATION.

*Organic Matter and Nitrites.*—One quarter of a litre, or 250 c. c. of the filtered water was mixed with 250 c. c. of distilled water, and 1·5 c. c. of sulphuric acid added; a little permanganate was dropped in, and the water raised to 140° Fah., at which temperature 3 c. c. of the standard permanganate solution was required to produce a pink colour lasting for 20 minutes. A second quarter litre was mixed with an equal quantity of distilled water, and

*Mauritius.*

after the addition of 1·5 c. c. of sulphuric acid the water was boiled for 10 minutes to drive off nitrous acid. It was then found that at the temperature of 140° 1·7 c. c. of the permanganate solution was required for the same permanent tint, showing that of the total 3 c. c., 1·3 c. c. was required for the oxidation of nitrites, and 1·7 c. c. for the organic matters. Multiplied by 4, to bring the quarter litre to 1 litre, 3 c. c. become 12 c. c., from which deduct ·6 for colour = 11·4, of which 4·9 for nitrites and 6·5 for organic matter. Each cubic centimetre of the permanganate solution represents ·0C01 gramme of oxygen.

One hundred grammes of the soil digested for 24 hours in 1 litre of distilled water, at a temperature between 80° and 90° Fah., yielded on filtration and evaporation of the water 0·12 grammes of total solids dissolved from the soil, or about 8½ grains per gallon. Of the total ·12 grammes, ·04 were lost by incineration, and ·08 remained as fixed solids.

The wetted earth after digestion and filtration of the water, was placed in a capsule to the amount of 65 grammes; this was thoroughly dried in a hot-air bath, when it was found to have lost 23·8 grammes of the preceding weight, which would represent about 36½ per cent. of retained water.

Ten grammes of the soil were treated with hydrochloric acid and zinc with the aid of heat. The dried residue weighed 6·87 grammes, and had a greyish white appearance. Under the microscope it seemed to consist mainly of quartz-like granules.

The acid fluid filtered from this was neutralised with ammonia giving a precipitate which consisted partly of oxide of iron, and weighed when dry 2·63 grammes.

The fluid separated from this precipitate by filtration was acted on by oxalate of ammonia, and a very small amount of oxalate of lime (·16 gramme) separated and weighed. To the remaining water solution of phosphate of soda was added. There was a faint appearance of precipitate, but it was scarcely appreciable by weight. The residue, insoluble in hydrochloric acid, when fused with carbonate of soda, left about three-fourths of its weight of insoluble silica.

As peroxide of iron formed an important ingredient in this soil, several experiments were made with solutions in hydrochloric and sulphuric acids, the result of which, though they were not precisely similar, as perhaps no two portions of the soil contained the same quantity of iron, were sufficiently close to be reliable, and gave a mean of ·6 grammes of metallic iron in 10 grammes, or about 6 in 100, which would correspond to very nearly 9 per cent. of the ferric oxide.

Ten grammes of the earth treated with sulphuric acid, zinc to reduce the peroxide, and heat gave a solution which required 35 c. c. of a standard solution of the bichromate of potash (14·75 grammes to the litre). One hundred cubic centimetres of this solution would cause the conversion of $\frac{3}{200}$ the weight of 6 atoms of iron in grammes, *i.e.*, 336 divided by 200 = 1·68 grammes, into $\frac{1}{200}$ the weight of 3 atoms of peroxide. Therefore, 35 c. c. the quantity used would represent ·58 grammes of iron converted into ferric oxide.

The determinations by the permanganate of potash gave a somewhat larger amount of iron, but the discrepancy was not great.

Solutions in hydrochloric acid gave nearly identical results with both the bichromate and permanganate to those which had been obtained with sulphuric acid.

Guano and other strong manures being largely used in cultivated parts of this soil, the quantity of organic matters in the specimen examined may be due to this cause, though it is not stated in the appended remarks if the earth was taken from a spot under culture.

*Mauritius.* *Examination made in the Hygienic Laboratory at Netley of a specimen of the Soil and Sub-soil on which the Artillery Barracks are built at Mauritius, by John O'Nial, Surgeon 51st Regiment.*

PHYSICAL APPEARANCES.

THE specimen submitted for examination appears to consist of—

1st. Fragments of igneous rock of a dark brown, almost black colour, very hard and containing a few particles of dark substance, apparently hornblende.

2nd. Forming the great proportion of the mass a dark brown earth, obviously the debritus of the above, and having mixed with it.

3rd. Numerous white modules which effervesce strongly with an acid. Fragments of coral.

4th. Fragments of a black substance, apparently charcoal, which burn to a white ash on incineration.

5th. Portions of woody fibre and roots of plants.

6th. Fragments of pottery of a modern character.

7th. Small pieces of bone.

The whole form a soil of a dark brown colour and very tenacious character.

Water penetrates it with great difficulty. By Pettenkoffer's experiment, to ascertain porosity water ascended in the earth burette only about three inches in 24 hours, and it remained at that point for several days. Finally, the level of the burettes had to be altered, that containing the water being placed very much above the level of the earth. Even then the water rose in the earth burette very slowly, and did not reach the surface for several days. The water absorbed by the earth ultimately amounted to 34·28 per cent.

Dried in the water bath the earth lost 12·01 per cent of its weight, and by incineration a further loss of 18·99 per cent. Total 31·00 per cent.

A portion of the earth (10 grammes, and water 1,000 c.c.) rubbed up in a mortar with pure distilled water remained turbid for an entire month. The matter in suspension was so fine as to pass through a filter.

The temperature having fallen below the freezing point the water became almost clear, only a very slight opalescence remaining.

The examination of this water gave the following results.

*Reaction.*—Neutral.

*Smell.*—None.

*Taste.*—No peculiarity of taste.

*Lime.*—With ammonium oxalate. No perceptible reaction.

*Chlorine.*—With dil. nit. acid and nit. argt. No perceptible reaction.

*Acid, Sulph.*—With hydrochloric acid dil. and bariam chloride. Slight cloudiness.

*Phosph. Acid.*—Acid nit. dil., molybdate of ammonia and boiled. No reaction.

*Nitric Acid.*—Brucine test. Rose zone very distinct.

*Nitrous Acid.*—Acid sulph. dil. sol. iod. pot. and starch. No reaction.

*Iron.*—With red and yellow prussiate of potash. No reaction.

*Organic Matter.*—A small portion boiled in a test tube with sol. gold perchloride. No reaction.

*Ammonia.*—Nessler's test. No reaction.

Although Nessler's solution, when added to the water simply in a test tube, gave no indications of the presence of ammonia, in subsequently carrying out Wanklyn and Chapman's process, ammonia was found to be present in the first portion of the distillate. The distillation was continued, as directed in their book, until the distillate ceased to give a reaction with Nessler's test solution. The second part of their process was then continued, and the result gave ammonia in the proportion of 0·0735 grains per gallon = ·268 grains of nitric acid per gallon.

A portion of the earth incinerated, boiled with sulphuric acid, treated with granulated zinc, and examined by permanganate solution, gave 5·495 per cent. of iron.

Another portion treated with hydrochloric acid gave the following results :— *Mauritius.*

| | | |
|---|---|---|
| Process (*a*) | Residue .. .. .. .. | 45·569 |
| „ (*b*) | Oxide of Iron and Alumina .. | 10·500 |
| „ (*c*) | Carbonate of Lime .. .. | 22·692 |
| „ (*d*) | Magnesia .. .. .. | 1·400 |
| | Water .. .. .. .. | 12·008 |
| | Loss .. .. .. .. | 7·831 |
| | Total .. .. | 100·000 |

The sediment deposited from the process formerly described was examined microscopically by Dr. Watson, whose notes on the subject are attached hereto.

Portions of the earth, moistened with pure distilled water were placed in two small bottles previously carefully cleaned. These were left in a water bath for a week at a temperature of 90° Fahrenheit; but I regret to say that the abrupt termination of the session left no time for their examination.

### Microscopic Examination.

After subsidence of the heavier particles the supernatant fluid was of a yellowish opaque appearance which, on being examined by the microscope × 225 and 350 with transmitted light, presented an abundance of most minute earthy particles, mostly amorphous but some translucent and apparently crystalline; with these were some bodies, few in number, having the appearance of fungus spores, but not well defined, owing to the adherence of fine earthy deposits. A very few monads had become developed in the fluid and were in active motion.

Dried on a slide and examined by light concentrated by the condenser, this deposit presented the appearance of a crust of impalpable earthy matter. The heavier part of the sediment examined by transmitted light showed amorphous and crystalline mineral particles, opaque and translucent, a little vegetable fibre, and the before mentioned impalbable earth.

A portion of this sediment was dried on a slide and examined by concentrated light with a low power (× 60), under which it presented the appearance of sand with grains of various colours, some white and quartz-like, others black; the latter were partly fragments of hornblende and other dark crystals of igneous rock, and partly blackened vegetable matters, as was shown by their disappearance when the slide was heated.

By incineration the deposit became of a light brick red colour, and the loss of the dried sediment by this process was nearly 12 per cent.

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## *Section* II.

### *On the Extent of Invaliding.*

During the year there were 35 invalids sent to England, and 14 were finally discharged the service at Netley, being respectively in the ratio of 52·7 and 21·1 per 1,000 of mean strength.

The disabilities of the invalids are stated in detail in Abstract No. 18 in the Appendix, from which the following classified summary has been framed :—

*Mauritius.*

| | Invalids sent to England. | Invalids Discharged the Service at Netley. |
|---|---|---|
| Paroxysmal Fevers .. .. .. | 21 | .. |
| Rheumatism .. .. .. .. | 1 | .. |
| Scrofula and Phthisis .. .. .. | 4 | 5 |
| Diseases of the— | | |
| Nervous System.. .. .. .. | 1 | 1 |
| Eye .. .. .. .. .. | 1 | 1 |
| Circulatory System .. .. .. | 3 | 1 |
| Respiratory „ .. .. .. | 1 | 1 |
| Digestive „ .. .. .. .. | 2 | 4 |
| Debility .. .. .. .. .. | 1 | .. |
| Accidental Injury .. .. .. .. | .. | 1 |
| Total .. .. .. | 35 | 14 |
| Ratio per 1,000 of Mean Strength .. .. { 1870 .. | 52·6 | 21·0 |
| { 1860–9.. | 41·5 | 16·4 |

The number sent home as invalids was considerably above the average of the preceding ten years, a result of the long continued prevalence of epidemic malarious fever; 21 men were sent to England on this account, but none were finally discharged the service. The proportion discharged at Netley was also above the average consumption and diseases of the digestive system being the chief disabilities.

*Section* III.

*Mean Daily Sick.*

The average number constantly sick throughout the year amounted to 26, being in the ratio of 39·10 per 1,000 of mean strength, and much under the proportion in the preceding year. The following Table gives the usual information on this head :—

| | 1870. | 1860–9. |
|---|---|---|
| Ratio per 1,000 of Strength constantly Sick .. .. .. | 39·10 | 45·37 |
| | Days. | Days. |
| Mean Sick-Time to each Soldier .. .. .. .. .. | 14·27 | 16·56 |
| Average duration of cases of Disease .. .. .. .. | 12·60 | 15·60 |

The mean daily sick, the mean sick time to each soldier, and the average duration of the cases, have all been considerably under the average of the last ten years. This desirable result has no doubt been mainly due to the circumstance of a body of healthy men having been substituted for men who had suffered greatly from malarious fever, which had been epidemic since 1866 in the island.

*Section* IV.

*Influence of Age on the Mortality.*

In consequence of the entire change of the troops in the island in the middle of the year the usual information on this subject cannot be obtained with accuracy.

# IX.—ON THE HEALTH OF THE TROOPS SERVING IN THE ISLANDS OF CEYLON AND LABUAN.

## *Section* I.

## *Sickness and Mortality.*

### I.—Ceylon.

STATISTICAL REPORT.

#### 1.—White Troops.

*Ceylon.*

No change of the corps employed in this island took place during the year. The average strength was 906 non-commissioned officers and men, the admissions into hospital amounted to 1,253, and the deaths to 20, including three of invalids on their passage to England. These numbers give the proportion of 1,383 admissions and 22·07 deaths per 1,000 of mean strength, both considerably lower than in the preceding year.

The diseases by which the sickness and mortality were caused are detailed in Abstract No. 17 in the Appendix; the classified results are shown in the following Table:—

Ceylon.

| Orders. | White Troops .. Diseases. | Strength, 906. Admitted. | Died. At Ceylon. | Died. Of Invalids. | Died. Total. | Annual Ratio per 1,000. 1870. Admitted. | 1870. Died. | 1869. Admitted. | 1869. Died. |
|---|---|---|---|---|---|---|---|---|---|
| | I. *General Diseases.* | | | | | | | | |
| 1 | Febrile Group .. | 168 | .. | .. | .. | 185·4 | .. | 271·5 | 3·31 |
| 2 | Constitutional „ .. | 142 | 2 | 1 | 3 | 156·7 | 3·31 | 138·0 | 6·63 |
| | II. *Local Diseases.* | | | | | | | | |
| | Diseases of the— | | | | | | | | |
| 1 | Nervous system .. | 9 | .. | .. | .. | 9·9 | .. | 6·6 | 2·21 |
| 2 | Eye .. .. .. | 43 | .. | .. | .. | 47·5 | .. | 49·7 | .. |
| 3 | Ear .. .. .. | 14 | .. | .. | .. | 15·5 | .. | 21·0 | .. |
| 5 | Circulatory system .. | 16 | 3 | 1 | 4 | 17·6 | 4·42 | 17·6 | 2·21 |
| 6 | Absorbent „ .. | 34 | .. | .. | .. | 37·5 | .. | 30·9 | .. |
| 8 | Respiratory „ .. | 53 | 1 | .. | 1 | 58·5 | 1·10 | 57·4 | 1·10 |
| 9 | Digestive „ .. | 346 | 9 | 1 | 10 | 381·9 | 11·04 | 379·7 | 7·73 |
| 10 | Urinary „ .. | 79 | 1 | .. | 1 | 87·2 | 1·10 | 79·5 | 1·10 |
| 11 | Generative „ .. | 22 | .. | .. | .. | 24·3 | .. | 35·3 | .. |
| 12 | Organs of Locomotion | 6 | .. | .. | .. | 6·6 | .. | 8·8 | .. |
| 13 | Cellular Tissue .. | 45 | .. | .. | .. | 49·7 | .. | 27·6 | .. |
| 14 | Cutaneous system .. | 135 | .. | .. | .. | 149·0 | .. | 172·2 | 1·10 |
| | III. *Conditions, &c.* | | | | | | | | |
| | Debility .. .. | 3 | .. | .. | .. | 3·3 | .. | 3·3 | .. |
| | IV. *Poisons* .. | 14 | 1 | .. | 1 | 15·5 | 1·10 | 50·8 | 1·10 |
| | V. *Injuries.* | | | | | | | | |
| 2 | Accidental .. .. | 124 | .. | .. | .. | 136·9 | .. | 136·9 | 2·21 |
| 4 | Self-inflicted .. .. | .. | .. | .. | .. | .. | .. | .. | 1·10 |
| | No appreciable disease | .. | .. | .. | .. | .. | .. | 6·6 | .. |
| | Total .. .. | 1,253 | 17 | 3 | 20 | 1383·0 | 22·07 | 1493·4 | 29·80 |
| | Average of 10 years, 1860–9 .. .. | .. | .. | .. | .. | 1424·9 | 23·75 | .. | .. |

The admissions and deaths have been under the average of the preceding 10 years.

General Diseases.—The diseases of the febrile group were much less prevalent and fatal than in 1869; and those of the constitutional group, though slightly more prevalent, gave rise to only half the ratio of mortality of that year. The admissions and deaths by the principal diseases forming this class were as follows:—

| General Diseases. | Admitted | Died. | Ratio per 1,000 of Mean Strength. | | | |
|---|---|---|---|---|---|---|
| | | | 1870. | | 1869. | |
| | | | Admitted | Died. | Admitted | Died. |
| *Febrile*— | | | | | | |
| Continued Fevers .. .. | 47 | .. | 51·9 | .. | 49·7 | 2·21 |
| Paroxysmal „ .. .. .. | 109 | .. | 120·3 | .. | 219·7 | 1·10 |
| Influenza.. .. .. .. | 12 | .. | 13·2 | .. | 2·2 | .. |
| *Constitutional*— | | | | | | |
| Rheumatism .. .. .. | 25 | .. | 27·5 | .. | 19·9 | .. |
| Syphilis .. .. .. .. | 94 | .. | 103·9 | .. | 70·6 | .. |
| Scrofula, Phthisis, &c. .. .. | 5 | 3 | 5·5 | 3·31 | 29·8 | 5·52 |
| Scurvy and Purpura .. .. | .. | .. | .. | .. | 1·1 | .. |
| Anæmia .. .. .. .. | 18 | .. | 19·8 | .. | 8·8 | .. |
| Other Diseases .. .. .. | .. | .. | .. | .. | 7·7 | 1·10 |

*Continued fevers* differed little in the ratio of admissions from the results of the preceding year. *Paroxysmal fevers*, however, were much less prevalent, but closely approximated the average of the preceding 10 years; neither form gave rise to any deaths.

The admissions by *syphilis* were nearly one-half higher than in 1869, the increase being exclusively in the primary form.

*Scrofula and phthisis* show a marked reduction in the admissions, and also in the deaths compared with 1869, but the latter were above the average of the last ten years.

Local Diseases have differed little from the preceding year. The mortality by *diseases of the digestive system* was higher, the increase being in fatal cases of dysentery. There was a decrease in diseases of the generative system, chiefly in orchitis; and there was an increase in those of the *cellular tissue*, particularly abscesses, but more than counterbalanced by a decrease in *diseases of the cutaneous system*.

Poisons.—There was a marked decrease in the admissions by *delirium tremens* and alcoholic poisoning, and only one death by the former.

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### 2. Asiatic Troops.

The Asiatic troops employed in the island consisted of Gun Lascars and the Ceylon Rifle Regiment with the exception of two companies stationed in Labuan. On the 10th of August two companies embarked at Ceylon to relieve the two at Labuan, which were in a very unhealthy condition and which arrived in Ceylon on the 10th September.

The average strength of this class of troops during the year was 846, the admissions into hospital among them were 659, and the deaths eight, being respectively in the ratio of 779 and 9·44 per 1,000 of mean strength, the former considerably higher and the latter a little lower than in the preceding year, but both much under the average of the last 10 years.

The admissions and deaths by the different diseases are stated in Abstract No. 17 in the Appendix, of which the following is a classified summary:—

*Ceylon.*

| Orders. | Black Troops .. .. Diseases. | Strength 846. Admitted | Died. | Annual Ratio per 1,000 of Mean Strength. 1870. Admitted | Died. | 1869. Admitted. | Died. |
|---|---|---|---|---|---|---|---|
| | I. *General Diseases.* | | | | | | |
| 1 | Febrile Group .. | 226 | 2 | 267·1 | 2·36 | 116·7 | 1·06 |
| 2 | Constitutional „ .. | 77 | 1 | 91·0 | 1·18 | 49·8 | 2·12 |
| | II. *Local Diseases.* Diseases of the— | | | | | | |
| 1 | Nervous System . .. | 2 | 2 | 2·4 | 2·36 | 4·2 | 1·06 |
| 2 | Eye .. .. .. | 32 | .. | 37·8 | .. | 50·9 | .. |
| 3 | Ear .. .. .. | .. | .. | .. | .. | 1·1 | .. |
| 5 | Circulatory System .. | 1 | .. | 1·2 | .. | 5·3 | 1·06 |
| 6 | Absorbent „ .. | 7 | .. | 8·3 | .. | 6·4 | .. |
| 8 | Respiratory „ .. | 55 | 2 | 65·0 | 2·36 | 44·5 | 4·24 |
| 9 | Digestive „ .. | 39 | 1 | 46·1 | 1·18 | 44·5 | .. |
| 10 | Urinary „ .. | 20 | .. | 23·6 | .. | 30·7 | .. |
| 11 | Generative „ .. | 18 | .. | 21·3 | .. | 11·7 | .. |
| 12 | Organs of Locomotion | .. | .. | .. | .. | 2·1 | .. |
| 13 | Cellular Tissue .. | 23 | .. | 27·2 | .. | 19·1 | .. |
| 14 | Cutaneous System .. | 105 | .. | 124·1 | .. | 89·1 | 1·06 |
| | III. *Conditions, &c.* | | | | | | |
| | Debility .. .. | 5 | .. | 5·9 | .. | .. | .. |
| | IV. *Poisons.* | 1 | .. | 1·2 | .. | .. | .. |
| | V. *Injuries.* | | | | | | |
| 2 | Accidental .. .. | 48 | .. | 56·7 | .. | 29·7 | .. |
| | Total .. .. | 659 | 8 | 778·9 | 9·44 | 505·8 | 10·60 |
| | Average of 10 years, 1860–69 .. | .. | .. | 1,011·6 | 15·17 | .. | .. |

General Diseases were much more prevalent than in 1869, but with a very slight increase of the mortality. The following Table shows the admissions and deaths by the principal diseases in this class:—

| Diseases. | Admitted. | Died. | Ratio per 1,000 of Mean Strength. 1870. Admitted. | Died. | 1869. Admitted. | Died. |
|---|---|---|---|---|---|---|
| *Febrile—* | | | | | | |
| Eruptive Fevers .. .. | 2 | .. | 2·4 | .. | 9·5 | .. |
| Continued „ .. .. | 1 | .. | 1·1 | .. | .. | .. |
| Paroxysmal „ .. .. | 221 | 1 | 261·2 | 1·18 | 104·9 | 1·06 |
| Malignant Cholera .. .. | .. | 1 | .. | 1·18 | .. | .. |
| Erysipelas .. .. .. | .. | .. | .. | .. | 1·1 | .. |
| Other diseases of this group. | 2 | .. | 2·4 | .. | 1·1 | .. |
| *Constitutional—* | | | | | | |
| Rheumatism .. .. | 40 | 1 | 47·3 | 1·18 | 28·6 | .. |
| Syphilis .. .. .. | 12 | .. | 14·2 | .. | 17·0 | .. |
| Scrofula, Phthisis, &c. .. | 2 | .. | 2·4 | .. | 4·2 | 2·12 |
| Anæmia .. .. .. | 6 | .. | 7·1 | .. | .. | .. |
| Other diseases of this group. | 17 | .. | 20·1 | .. | .. | .. |

*Eruptive fevers* were the cause of only two admissions, both by chickenpox. *Paroxysmal fevers* were more than twice as prevalent as in 1869, but were considerably under the average of the last ten years. The increase in the admissions was attributed by the Medical Officer in charge to the return of the two companies from Labuan, where the men had become saturated with malaria. *Ceylon.*

The death from *cholera* occurred in a man on furlough at Batticalao. There was an increase in the amount of *rheumatism* compared with the preceding year, but it was slightly under the average. The large proportion of admissions by "other diseases" of the constitutional group was mainly due to the occurrence of 14 cases of *Beri-Beri* among the men from Labuan, where the disease had been very prevalent and fatal in the detachment. None of the cases died after the return of the men to Ceylon, but four were discharged as invalids on account of it. The disease was manifestly due not to Ceylon but to Labuan.

LOCAL DISEASES.—There has been a satisfactory reduction in the amount of *ophthalmia*, but diseases of the respiratory, generative, and cutaneous systems, were considerably more prevalent than in the preceding year.

ACCIDENTAL INJURIES furnished a much higher ratio of admissions than in 1869, but there were no fatal accidents nor self-inflicted deaths.

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## II.—LABUAN.

### STATISTICAL REPORT.

AT the beginning of the year the garrison consisted of two companies of the Ceylon Rifles, 154 strong, which, on account of their extreme unhealthiness, were relieved towards the end of August by two other companies of the same regiment, and returned to Ceylon. *Labuan.*

The average strength of the troops during the year was 139; the admissions into hospital were 256, and the deaths 28; but to the latter must be added six which occurred among invalids on their passage from Labuan to Ceylon, making a total of 34 deaths. These numbers give the proportion of 1842 admissions, and 244·6 deaths per 1,000 of mean strength. But all the deaths occurred in the companies which were in the Island at the beginning of the year, and which therefore in eight months lost between one-fourth and one-fifth of their number.

The following Table, framed from No. 17 in the Appendix, shows the admissions and deaths by the different classes of diseases:—

*Labuan.*

| Orders. | Classes of Diseases. | Average Strength .. .. 139 — 1870. Admitted. | Died. In the Island. | Died. Of Invalids. | Total Deaths. | Ratio per 1,000. Admitted. | Ratio per 1,000. Died. |
|---|---|---|---|---|---|---|---|
| | I. *General Diseases* | | | | | | |
| 1 | Febrile Group .. .. | 175 | 18 | 4 | 22 | 1259·0 | 158·28 |
| 2 | Constitutional Group . .. | 38 | 8 | 2 | 10 | 273·4 | 71·94 |
| | II. *Local Diseases.* | | | | | | |
| | Diseases of the— | | | | | | |
| 2 | Eye .. .. .. .. | 2 | .. | .. | .. | 14·3 | .. |
| 5 | Circulatory System .. .. | 1 | 1 | .. | 1 | 7·2 | 7·19 |
| 8 | Respiratory „ .. .. | 7 | 1 | .. | 1 | 50·4 | 7·19 |
| 9 | Digestive „ .. .. | 6 | .. | .. | .. | 43·2 | .. |
| 10 | Urinary „ .. .. | 1 | .. | .. | .. | 7·2 | .. |
| 11 | Generative „ .. .. | 1 | .. | .. | .. | 7·2 | .. |
| 13 | Cellular Tissue .. .. | 2 | .. | .. | .. | 14·3 | .. |
| 14 | Cutaneous System .. .. | 18 | .. | .. | .. | 129·5 | .. |
| | V. *Injuries.* | | | | | | |
| 2 | Accidental .. .. .. | 5 | .. | .. | .. | 36·0 | .. |
| | Total .. .. .. | 256 | 28 | 6 | 34 | 1841·7 | 244·60 |

General Diseases have been the cause of five-sixths of the admissions, and of all the deaths but two.

The following Table shows the admissions and deaths by each of the principal diseases in this class:—

| General Diseases. | Admitted. | Died. | Ratio per 1,000 of Strength. Admitted. | Ratio per 1,000 of Strength. Died. |
|---|---|---|---|---|
| *Febrile—* | | | | |
| Continued Fever .. .. | 1 | .. | 7·2 | .. |
| Paroxysmal „ .. .. | 174 | 22 | 1251·8 | 158·28 |
| *Constitutional—* | | | | |
| Rheumatism .. .. .. | 5 | .. | 36·0 | .. |
| Anæmia .. .. .. .. | 15 | 5 | 107·9 | 35·97 |
| Beri-Beri .. .. .. | 18 | 5 | 129·5 | 35·97 |

*Paroxysmal Fevers* were the chief cause of admissions and also of the deaths; but the Medical Officer in charge states that all the fatal cases showed more or less fully the symptoms of Beri-Beri, which he considers a result of malarious poison. The deaths from anæmia ought also to have been returned under the head of Beri-Beri. As a full report on this disease will be found at p. 490, of this volume, it appears unnecessary here to enter into details. The two companies of the Ceylon Rifles which arrived in the end of August had 28 admissions by ague in the next four months; as their strength was

163, the admissions by this disease were in the annual ratio of 500 per 1,000 of strength,—another proof of the malarious character of the station. *Labuan.*

None of the other classes of diseases seem to require comment, except that it may be noted that notwithstanding the excessive malaria, dysentery and diarrhœa were not developed, only two cases of each having been admitted during the year.

Owing to defects in the returns we are unable to give the usual information regarding the extent of invaliding and the mean daily sick. Assistant-Surgeon Barry, who was in medical charge during the first eight months, states in his Report that 54 men were invalided, but has not furnished a return of their disabilities. It would appear from this statement that the two companies lost more than half their numbers by deaths and invaliding in the course of eight months.

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SANITARY REPORT.

Surgeon Roe, the Senior Medical Officer, reports:— *Ceylon.*

Ceylon, which for many years had been regarded as the *terra incognita* of our Eastern possessions, has become easily accessible within the last twelve months by alterations and improvements in its steam communication, and especially by the opening of the Suez Canal.

In my Report for 1869 allusion was made to certain marked changes which characterized the meteorology of that year, more especially with reference to the rainfall. It was also stated that those who were well acquainted with the peculiarities of the climate of Ceylon, regarded the unusually damp season of 1869 as the commencement of a cycle of wet years, and this idea has been in a measure borne out during 1870; but the most noteworthy feature of the meteorology of the year was the unusual occurrence of very heavy rains at Colombo during the N. E. monsoon, the comparative absence of them during the S. W. monsoon (which has always been regarded as the wet season) and the unprecedented rainfall of 39 inches in October.

It is a remarkable fact, and one not easily accounted for, that Ceylon, with its moist climate and a soil which is capable of growing in luxuriance not only all the tropical fruits and vegetables, but at suitable elevation and with due cultivation those regarded as European, is more scantily supplied with vegetable productions fit for human food than any other station in the East. It is, however, now contemplated to establish a model farm (a sum of 10,000*l.* having been munificently furnished by a wealthy Cingalese for that purpose).

The meat is of the toughest and coarsest description, and no attempt has hitherto been made to improve its quality by feeding or otherwise. Beef is the staple animal food supplied to the troops, and although they receive the best procurable, it is almost invariably tough, lean, and indigestible, and doubtless tends to cause diseases of the digestive system. If the troops were located in the hills (as I submit they ought to be) they could, by the cultivation of gardens, or even a farm, supply themselves and others with as good food, both animal and vegetable, as could be obtained in any market town in England.

At all the stations in the Command water is obtained from well constructed wells. The supply is abundant and generally of fair quality, and within a few months Colombo will be supplied with excellent water by the "Colombo Gas and Water Company", and it is to be hoped that Kandy will soon follow this good example.

In addition to the cloth clothing supplied to soldiers in England, all the troops in the Command are furnished with suits of serge and white cotton drill. These are suitable to the climate, and are comfortable and in accordance with the tastes of the European troops. The native troops do not like the serge clothing, and would prefer garments fashioned more in accordance with Oriental ideas of ease and comfort.

With one or two exceptions, no ovens or special cooking apparatus have been provided for the troops in the Command; and it is doubtful if the native cooks would be able to use any elaborate or scientific kitchen ranges, such as

*Ceylon.*

are now in general use at home and elsewhere. Major Hutchinson's plan has proved a marked success; its simplicity and the varied manner in which it enables the most unskilled to cook being its chief recommendations.

The various stations in the Ceylon Command are not, as a rule, well supplied with latrines, urinals, and ablution rooms; and at no station has the great luxury of the East, a swimming bath, been established.

Dry earth latrines have been for some time in use at Colombo, Kandy, and Newera Ellia. They have not however been uniformly successful, nor have their merits been fully appreciated.

At Colombo and Kandy the men bathe in fresh water lakes, and at Newera Ellia there is a plunge bath, but in each case the water is by no means pure; and suitable and well-constructed swimming baths should be provided for the men at Colombo, Galle, Kandy, and Trincomalee.

The duties of the troops in Ceylon are by no means severe or in any way prejudicial to health, and the utmost care is taken that the men are not unduly exposed to the sun. Whilst the ramparts of the old fort at Colombo were undergoing demolition, the European troops were at suitable hours employed thereon, and this judicious use of military labour improved the health of the men and relieved the *ennui* and monotony of their lives.

The civil population being composed of natives, or Europeans of a higher standing in the social scale than the class which furnishes the majority of soldiers, the men are thrown for society entirely on their comrades.

I am very decidedly of opinion that every soldier stationed in Ceylon should have his spare hours fully occupied, and if he does not know a trade he should be taught one, or at all events be employed on a garden or a farm.

Dysentery, diarrhœa, and diseases of the digestive system continue to be frequent amongst the European troops. These diseases were very common, and of a particularly fatal type at Colmobo; and in considering them it is interesting to note that in every one of the six fatal cases that occurred there, the post-mortem examination revealed hepatic abscess; of these cases two were returned as dysentery and two as diarrhœa. Besides these fatal cases of abscess of the liver occurring at Colombo, three of the invalids who were sent to England from the same station in December were supposed to be suffering from that disease, thus giving the Head-Quarter Station of the Command an unenviable pre-eminence in producing fatal liver disease.

"It will be noticed that during the year there were many admissions for "beri-beri. All these cases were of men who were invalided from Labuan with "that disease, which was very frequent and exceedingly fatal amongst the men "of the detachment of the Ceylon Rifle Regiment there stationed, thirty-five "fatal cases having occurred in a detachment of about 150 men during that "period."

Surgeon Roe goes on to state his opinion, which coincides with that expressed in a Report furnished by Assistant Surgeon Barry on this subject, that the disease was attributable to malaria in its worst and most concentrated form.

In my report for 1869, I particularly noticed the steps which were then meditated with reference to the erection of new barracks at various stations in the Command, and I strongly urged the advisableness of taking advantage of the opportunity that then occurred of locating the greater part of the European troops in the hills. New barracks have, however, been commenced at Colombo, and at the same station a very beautiful new hospital for European troops is all but completed on the parade ground of the Ceylon Rifle Regiment; two new quarters (one for the Commanding Officers of the Royal Artillery, and the other for the Commanding Officer of the European Regiment) are in process of erection, and, in the vicinity of the new hospital, quarters are being built for a Surgeon and an Assistant-Surgeon. The hospital is a magnificent two-storied pile, situated on the Galle Face Esplanade, within about a quarter of a mile of the sea, and about half a mile from the new barracks lately commenced. It is built on arches and, when finished, will be well lighted and ventilated, and will afford excellent accommodation for the sick of any European force that may be stationed in Colombo. The new barracks at the same station will also doubtless be constructed with due regard to every

sanitary requirement, and a site has been selected for their erection, which will secure as far as possible perfect perflation at all seasons. Notwithstanding the care which will be taken to make these new buildings at Colombo as perfect as possible, I regard the erection of barracks at Colombo for any European force greater than a small detachment, in a sanitary point of view, as a mistake. I believe that these barracks are being erected in accordance with the recommendations of the Royal Commission which held its proceedings here in 1865.

Besides a hill sanitarium on Horton Plains, I would recommend the formation of a small marine one at Mount Lavinia, which, although within 7 miles of Colombo, is much cooler and at all seasons enjoys a sea breeze.

The scheme for the erection of new barracks at Colombo for a considerable European force should be curtailed, and merely sufficient accommodation provided there for a small detachment which should be relieved every six months by a detachment from Horton Plains.

The hospital now nearly completed at Colombo should be a general hospital, and as such it would afford accommodation for the sick of both European and native troops, if the force of the former were reduced as recommended to a small detachment.

I trust that these latter suggestions will be deemed of sufficient importance to call for prompt notice.

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## *Section* II.

### *On the Extent of Invaliding.*

During the year 49 invalids of the European troops were sent to England and 18 were finally discharged the Service at Netley being in the ratio of 54·1 and 19·9 per 1,000 of mean strength; and of the Asiatic troops 47 were discharged the Service, or 55·5 per 1,000. These results, but particularly the ratio for the Asiatic troops, are all higher than in the preceding year.

The following Table shows the classes of disabilities for which the men were invalided. The details will be found in Abstract No. 18 in the Appendix.

| | European Troops. | | Asiatic Troops. |
|---|---|---|---|
| | Invalids sent to England. | Invalids Discharged at Netley. | Discharged as Invalids in Ceylon. |
| Rheumatism .. .. .. | .. | 1 | 11 |
| Syphilis .. .. .. .. | 3 | 2 | 2 |
| Scrofula and Phthisis .. .. | 2 | 9 | 1 |
| Anæmia .. .. .. .. | 3 | .. | .. |
| Beri-Beri .. .. .. .. | .. | .. | 4 |
| Diseases of the— | | | |
| Nervous System .. .. | .. | .. | 1 |
| Eye .. .. .. .. | 1 | .. | 1 |
| Circulatory System .. .. | 3 | 2 | .. |
| Respiratory „ .. .. | 2 | .. | 2 |
| Digestive „ .. .. | 22 | .. | 1 |
| Urinary „ .. .. | 4 | 1 | .. |
| Organs of Locomotion .. .. | 3 | 1 | .. |
| Cutaneous System .. .. | 1 | .. | 1 |
| Debility .. .. .. .. | 2 | 1 | 23 |
| Accidental Injuries .. .. | 3 | 1 | .. |
| Total .. .. | 49 | 18 | 47 |
| Ratio per 1,000 of Mean Strength .. .. 1870 | 54·1 | 19·9 | 55·5 |
| Ratio per 1,000 of Mean Strength .. .. 1860-9 | 50·2 | 21·6 | 16 7 |

*Ceylon.* The number of invalids sent to England was slightly above and those discharged at Netley slightly below the average of the preceding ten years. Dysentery and hepatitis were the chief disabilities among the former, and phthisis the cause of discharge of one-half of the latter. The invaliding of the native troops was very high, but the 23 cases discharged under the head of debility were all old soldiers, having upwards of 20 years' service, and all but two above 40 years of age, and 9 of the 11 men discharged for rheumatism belonged to the same class. The disability was therefore probably more the result of age than of any special circumstances connected with the Service.

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## *Section* III.

### *Mean Daily Sick.*

The average numbers constantly non-effective from sickness were 57 of the European and 31 of the Asiatic troops, being respectively in the ratio of 62·9 and 36·6 per 1,000 of mean strength.

| | European Troops. | | Asiatic Troops. | |
|---|---|---|---|---|
| | 1870. | 1860–9. | 1870. | 1860-9. |
| Ratio per 1,000 of Strength constantly sick | 62·91 | 66·52 | 36·64 | 33·32 |
| | days. | days. | days. | days. |
| Average sick time to each Soldier .. .. | 22·96 | 24·28 | 13·37 | 12·16 |
| Average duration of cases of Sickness .. | 16·60 | 17·04 | 17·17 | 12·03 |

There has been a slight increase in all these particulars among the European troops compared with the results for 1869, but they have all been under the average of the last ten years. As regards the Asiatic troops, not only has there been a very marked increase compared with last year, except as regards the duration of the cases, but the results have been considerably above the average of the preceding ten years. This has been due to the number of sickly men who returned with the detachment from Labuan labouring under chronic disease, the result of saturation with malaria.

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## *Section* IV.

### *On the Influence of Age on the Mortality.*

The following Table shows the composition of the European force as regards age on the 1st January, and the deaths at each age during the year. The returns for the Ceylon Rifles are not available in consequence of the two companies at Labuan having been included :—

| White Troops. | Under 20 Years. | | 20 and under 25. | | 25 and under 30. | | 30 and under 35. | | 35 and under 40. | | 40 and upwards. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Corps. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. |
| Royal Artillery ... ... ... | 8 | ... | 24 | ... | 40 | ... | 45 | ... | 33 | 2 | 2 | ... |
| 73rd Foot ... ... ... ... | 112 | ... | 207 | 5 | 201 | 7 | 84 | 2 | 13 | 1 | ... | ... |
| Total ... ... ... | 120 | ... | 231 | 5 | 241 | 7 | 129 | 2 | 46 | 3 | 2 | ... |
| Ratio per 1,000 of strength { 1870 ... ... | ... | | 21·64 | | 29·04 | | 15·50 | | 65·22 | | ... | |
| { 1860-9 ... | 7·60 | | 16·25 | | 29·96 | | 31·75 | | 56·25 | | 66·67 | |

If allowance be made for the smallness of the number under observation the results do not differ materially from the average of the preceding ten years, the chief features being the rapid increase in the ratio with the advance of years, and the break in the progressive increase at the ages 30 to 35, probably due to the operation of the limited Enlistment Act.

# X.—ON THE HEALTH OF THE TROOPS IN THE AUSTRALASIAN COLONIES.

## *Section* I.

## *Sickness and Mortality.*

### STATISTICAL REPORT.

*Australia.*

At the beginning of the year the force in Australia and Tasmania consisted of a Battery of Royal Artillery, and the 2nd Battalion 14th Regiment; and in New Zealand of the 2nd Battalion 18th Regiment. In the middle of February the latter corps embarked for Australia, when it relieved the 14th, which returned to England. On the 23rd August the Artillery and 18th Regiment embarked for England, and were not replaced by other troops.

The average annual strength of the troops in New Zealand and Australia during the year was 609; the admissions into hospital were 470, and the deaths 5, being in the ratio of 772 and 8·21 per 1,000 of mean strength.

As these Colonies have now been given up as stations for troops and the returns extend only over a portion of the year, it does not appear necessary to enter into the usual details of the diseases, more especially as there was no epidemic or particular prevalence of disease among the troops. It may be sufficient to state that the deaths, of which one occurred in the Artillery and two in each of the Line Regiments, were caused by the following diseases:—two by consumption, one by acute rheumatism, one by aneurism of aorta, and one by fracture of skull—the man in the last case having, while in a state of intoxication, been knocked down by a car in the streets of Melbourne.

*Mean Sick.*—The mean daily sick furnished an annual average of 24 or 39·41 per 1,000 of mean annual strength; a result which corresponds very closely with that of the preceding year. The average sick time to each soldier, calculated on these numbers, was 14·38, and the average duration of the cases 18·64 days, or almost exactly the mean of New Zealand and Australia in 1869, and, except the duration of the cases, slightly above the average of the last ten years.

# XI.—ON THE HEALTH OF THE TROOPS SERVING IN CHINA AND JAPAN.

## *Section* I.

## *Sickness and Mortality.*

### I. China.

#### STATISTICAL REPORT.

#### 1. White Troops.

*China.*

The troops in China during the year consisted of a Battery of Royal Artillery, with a few Royal Engineers, a wing of the 75th Regiment, and a detachment of the 1st Battalion 10th Regiment for eight weeks in April and May while awaiting transport to England. The average strength of the troops was 546, the admissions into hospital amounted to 1,096, and the deaths to 7, including one of the invalids on passage to England. These numbers give the ratio of 2,007 admissions and 12·82 deaths per 1,000 of mean strength, the former being very much higher and the deaths lower than in the preceding year. The admissions, however, were a little under the average of the last ten years.

The following Table framed from Abstract No. 19 in the Appendix, shows the admissions and deaths by the different classes of diseases :—

*China.*

| Order. | Diseases. | Strength .. .. 546. Admitted. | Died. In China. | Died. Of Invalids. | Died. Total. | Ratio per 1,000 of Mean Strength. 1870. Admitted. | 1870. Died. | 1869. Admitted. | 1869. Died. |
|---|---|---|---|---|---|---|---|---|---|
| | I. *General Diseases.* | | | | | | | | |
| 1 | Febrile Group .. | 587 | 1 | .. | 1 | 1075·1 | 1·83 | 258·2 | .. |
| 2 | Constitutional Group | 52 | 2 | .. | 2 | 95·2 | 3·67 | 117·8 | 6·94 |
| | II. *Local Diseases.* Diseases of the— | | | | | | | | |
| 1 | Nervous System .. | 8 | .. | .. | .. | 14·6 | .. | 17·3 | 1·73 |
| 2 | Eye .. .. .. | 36 | .. | .. | .. | 65·9 | .. | 13·9 | .. |
| 3 | Ear .. .. .. | 12 | .. | .. | .. | 21·9 | .. | 5·2 | .. |
| 4 | Nose .. .. .. | 2 | .. | .. | .. | 3·6 | .. | 1·7 | .. |
| 5 | Circulatory System .. | 10 | 1 | .. | 1 | 18·3 | 1·83 | 13·9 | 5·20 |
| 6 | Absorbent „ .. | 1 | .. | .. | .. | 1·8 | .. | 5·2 | .. |
| 8 | Respiratory „ .. | 10 | .. | .. | .. | 18·3 | .. | 62·4 | 1·73 |
| 9 | Digestive „ .. | 165 | .. | .. | .. | 302·2 | .. | 284·2 | 1·73 |
| 10 | Urinary „ .. | 49 | .. | .. | .. | 89·7 | .. | 110·9 | .. |
| 11 | Generative „ .. | 22 | .. | .. | .. | 40·3 | .. | 29·5 | .. |
| 12 | Organs of Locomotion | 3 | .. | .. | .. | 5·9 | .. | .. | .. |
| 13 | Cellular Tissue .. | 15 | .. | .. | .. | 27·4 | .. | 10·4 | .. |
| 14 | Cutaneous System .. | 48 | .. | .. | .. | 87·9 | .. | 64·1 | .. |
| | III. *Conditions, &c.* | | | | | | | | |
| | Debility .. .. | 6 | .. | 1 | 1 | 11·0 | 1·83 | 3·5 | .. |
| | IV. *Poisons* .. | 9 | 1 | .. | 1 | 16·5 | 1·83 | 27·7 | 1·73 |
| | V. *Injuries.* | | | | | | | | |
| 2 | Accidental .. .. | 60 | 1 | .. | 1 | 109·9 | 1·83 | 112·7 | .. |
| | VI. *Surgical Operations* | .. | .. | .. | .. | .. | .. | 5·2 | .. |
| | No appreciable Disease | 1 | .. | .. | .. | 1·8 | .. | 3·5 | .. |
| | Total.. .. | 1,096 | 6 | 1 | 7 | 2007·3 | 12·82 | 1147·3 | 19·06 |
| | Average of 10 years, 1860–69 .. .. | .. | .. | .. | .. | 2122·4 | 43·30 | .. | .. |

General Diseases were the cause of nearly the whole increase in the admissions, and this was confined to the febrile group, the ratio of cases in it being more than four times that of the preceding year. The following Table shows the admissions and deaths by the principal diseases of this class;—

| General Diseases. | Admitted. | Died. | Ratio per 1,000 of Mean Strength. 1870. Admitted. | 1870. Died. | 1869. Admitted. | 1869. Died. |
|---|---|---|---|---|---|---|
| *Febrile—* | | | | | | |
| Eruptive Fevers .. .. .. .. | 1 | .. | 1·8 | .. | .. | .. |
| Continued „ .. .. .. .. | 1 | .. | 1·8 | .. | 5·2 | .. |
| Paroxysmal „ .. .. .. .. | 581 | 1 | 1064·1 | 1·83 | 249·6 | .. |
| Influenza .. .. .. .. .. | 2 | .. | 3·7 | .. | .. | .. |
| Erysipelas .. .. .. .. .. | 1 | .. | 1·8 | .. | 1·7 | .. |
| Other diseases of this group .. .. | 1 | .. | 1·8 | .. | 1·7 | .. |
| *Constitutional—* | | | | | | |
| Rheumatism .. .. .. .. | 7 | .. | 12·8 | .. | 31·2 | .. |
| Syphilis .. .. .. .. .. | 31 | .. | 56·8 | .. | 71·0 | .. |
| Scrofula, Phthisis, &c. .. .. .. | 11 | 2 | 20·1 | 3·67 | 15·6 | 6·94 |
| Scurvy and Purpura .. .. .. | 1 | .. | 1·8 | .. | .. | .. |
| Anæmia .. .. .. .. .. | 2 | .. | 3·7 | .. | .. | .. |

In the febrile group the only important difference has been in the paroxysmal fevers, which were more than four times as prevalent as in 1869, but without a corresponding increase in the mortality. The great excess occurred in the 75th Regiment, in which remittent fever prevailed from May till December inclusive, during which period 476 cases of it were admitted into hospital from a strength of about 400 men. But, although so prevalent, the disease was not of a fatal character, only one death from it having occurred in the Command during the year. The principal Medical Officer attributed the great prevalence of fever in this corps to a portion of it having occupied the new barracks which had just been completed, but he does not consider that this would altogether account for the much greater prevalence of fever in the 75th than in the Battery of Royal Artillery.

The admissions by rheumatism were much lower than in 1869. Those by syphilis show a decrease upon the amount of the preceding year, which was exceptionally low, and contrast favourably with previous periods in this Command and with the proportion among troops serving at home.

The admissions by scrofula and phthisis were exceptionally high, probably an accidental variation owing to the small numbers under observation; the mortality was slightly above the average of the Command.

Diseases of the Eyes gave rise to about five times the average proportion of admissions, but this was entirely owing to the occurrence of 24 cases of ophthalmia in the detachment of the 10th Regiment among men who had contracted a liability to the disease in Japan. The cases in the Artillery and 74th Regiment amounted only to 9, which would correspond very closely with the average of previous years.

Diseases of the Respiratory System were much less, but those of the Digestive System were more prevalent than in 1869 chiefly from an increase in the cases of diarrhœa, probably attributable to the same causes as the epidemic fever, the excess having occurred in the 75th Regiment.

Diseases of the Urinary System also furnish a much lower ratio of admissions, the decrease being entirely in cases of gonorrhœa.

There was also marked decrease in the amount of *delirium tremens*, of which there were only nine cases, but one of them proved fatal.

*China.*

### 2. Native or Asiatic Troops.

In the end of December the 13th Madras Native Infantry relieved the 29th, which returned to India, and which, with the gun Lascars, had constituted the Asiatic Force at Hong Kong during the year. The average strength of these troops was 846; the admissions into hospital from them were 1,147, and the deaths 22, being respectively in the ratio of 1,356, and 26·01 per 1,000 of mean strength, the former more than double, and the latter more than three and a half per 1,000 above the ratio of the preceding year, but both under the average of the last ten years.

The admissions and deaths by the different classes of diseases are shown in the following Table framed from Abstract No. 19 in the Appendix.

| Orders. | Native Troops. Diseases. | Average Strength, 846. Admitted. | Deaths. | Ratio per 1,000 of Mean Strength. 1870. Admitted. | Died. | 1869. Admitted. | Died. |
|---|---|---|---|---|---|---|---|
| | I. *General Diseases.* | | | | | | |
| 1 | Febrile Group .. .. | 765 | 6 | 904·2 | 7·09 | 167·6 | .. |
| 2 | Constitutional Group .. | 28 | 3 | 33·1 | 3·55 | 68·2 | 2·23 |
| | II. *Local Diseases.* Diseases of the— | | | | | | |
| 1 | Nervous System .. .. | 9 | 3 | 10·6 | 3·55 | 11·2 | 2·23 |
| 2 | Eye .. .. .. | 9 | .. | 10·6 | .. | 5·6 | .. |
| 4 | Nose .. .. .. | .. | .. | .. | .. | 1·1 | .. |
| 5 | Circulatory System .. | 1 | 1 | 1·2 | 1·18 | 2·2 | 3·35 |
| 8 | Respiratory ,, .. | 38 | 3 | 44·9 | 3·55 | 41·3 | 1·12 |
| 9 | Digestive ,, .. | 155 | 5 | 183·2 | 5·91 | 172·1 | 13·41 |
| 10 | Urinary ,, .. | 6 | .. | 7·1 | .. | 15·7 | .. |
| 11 | Generative ,, .. | 2 | .. | 2·4 | .. | 2·2 | .. |
| 12 | Organs of Locomotion .. | 1 | .. | 1·2 | .. | .. | .. |
| 13 | Cellular Tissue .. .. | 24 | .. | 28·4 | .. | 22·3 | .. |
| 14 | Cutaneous System .. | 51 | .. | 60·3 | .. | 45·8 | .. |
| | III. *Conditions, &c.* | | | | | | |
| | Debility .. .. .. | 18 | .. | 21·3 | .. | 17·9 | .. |
| | IV. *Poisons.* .. | 6 | 1 | 7·1 | 1·18 | .. | .. |
| | V. *Injuries.* | | | | | | |
| 2 | Accidental.. .. .. | 33 | .. | 39·0 | .. | 22·3 | .. |
| | No appreciable disease .. | 1 | .. | 1·2 | .. | .. | .. |
| | Total .. .. | 1,147 | 22 | 1355·8 | 26·01 | 595·5 | 22·34 |
| | Average of 10 years, 1860-69 .. .. | .. | .. | 1501·6 | 27·67 | .. | .. |

General Diseases.—As among the European troops, so there was a great increase in the admissions by the febrile, with a decrease in those by the constitutional group, among the Asiatic troops. The diseases of the febrile group were more than five times as prevalent as in 1869. The following Table shows the influence of the principal affections in this class upon the sickness and mortality:—

| Asiatic Troops. | Admitted. | Died. | Annual Ratio per 1,000 of Strength. | | | |
|---|---|---|---|---|---|---|
| | | | 1870. | | 1860. | |
| General Diseases. | | | Admitted. | Died. | Admitted. | Died. |
| *Febrile—* | | | | | | |
| Eruptive Fevers | 4 | .. | 4·7 | .. | 1·1 | .. |
| Continued ,, | 2 | .. | 2·3 | .. | .. | .. |
| Paroxysmal Fevers | 759 | 6 | 897·2 | 7·09 | 166·5 | .. |
| *Constitutional—* | | | | | | |
| Rheumatism | 12 | .. | 14·2 | .. | 51·4 | 1·12 |
| Syphilis | 10 | .. | 11·8 | .. | 3·3 | .. |
| Scrofula, Phthisis, &c. | 2 | 2 | 2·4 | 2·36 | 2·2 | .. |
| Anæmia | 1 | .. | 1·2 | .. | .. | .. |
| Other Diseases | 3 | 1 | 3·5 | 1·18 | 11·2 | 1·12 |

The great excess in the admissions by this class was caused by the prevalence of ague in the 29th Madras Native Infantry, in which 724 cases occurred in an average strength of 759, while the Gun Lascars had only 33 cases of remittent fever and none returned as ague in a strength of 69 men. No reason beyond the general unhealthiness of the season has been assigned by the Principal Medical Officer for this great sickness in the Madras Native Infantry, and unfortunately the Medical Officer in charge of the corps did not forward any report with his returns.

Local Diseases.—The prevalence of the different classes did not differ very materially from the preceding year. There was an increase in the amount of diseases of the digestive system, manifested chiefly in dysentery and dyspepsia, but the mortality was reduced by more than one-half.

None of the other diseases seem to require special notice.

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### SANITARY REPORT.

Deputy Inspector-General Ewing reports:—

The past season has been unhealthy both as regards the garrison and the civil population. Malarious fevers, chiefly of a remittent type, prevailed during the hot weather and until the end of the year.

The deaths from these serious maladies, compared with the admissions into hospital, were not numerous, but it was necessary to invalide many Europeans to England; and the health of the white troops, particularly the wing of the 75th Regiment, became seriously deteriorated from repeated attacks.

The new barracks in which a part of the 75th Regiment was quartered were found to be unhealthy, particularly those blocks last erected. This was considered (I believe with good reason) to have arisen from the recent disturbance of the soil which necessarily took place in preparing the site. As a remedy it was recommended to lay down concrete, and thus prevent the escape of malarious exhalations. The planting of trees was also advised with the view of counteracting these effects.

New barracks, which were much required, have been built for the married European soldiers and their families. They seem well adapted to the purposes and supplied with every requisite. They have not yet been occupied.

There have been no changes during the year as to increased cubic space in barracks and hospitals, or in the ventilation of barracks and hospitals, or as to increased facilities for ablution, extended means for variety of cooking, or in the scale of diet, all these arrangements having been tolerably satisfactory.

Venereal disease has been by no means prevalent.

The Contagious Diseases Ordinance of 1867 is in force, and its provisions have proved of the greatest benefit.

## II. JAPAN.

*Japan.* The garrison consisted of the 1st Battalion 10th Regiment and a small detachment of Royal Artillery and Engineers. The average strength during the year was 624, the admissions into hospital were 968, and the deaths 12, including those of invalids on their way to England. These numbers give the ratio of 1,551 admissions, and 19·21 deaths per 1,000 of mean strength, both higher than in the preceding year.

The following Table, framed from No. 19 in the Appendix, shows the influence of the different classes of diseases in causing sickness and mortality in this Command:—

| Orders. | Average Annual Strength, 624. Diseases. | Admissions. | Deaths. In Japan. | Deaths. Of Invalids. | Deaths. Total. | Ratio per 1,000. 1870. Admitted. | Ratio per 1,000. 1870. Died. | Ratio per 1,000. 1869. Admitted. | Ratio per 1,000. 1869. Died. |
|---|---|---|---|---|---|---|---|---|---|
| | I. *General Diseases.* | | | | | | | | |
| 1 | Febrile Group .. | 133 | 3 | .. | 3 | 213·2 | 4·81 | 128·0 | 2·97 |
| 2 | Constitutional „ .. | 189 | 1 | .. | 1 | 302·9 | 1·60 | 300·6 | .. |
| | II. *Local Diseases.* Diseases of the— | | | | | | | | |
| 1 | Nervous System .. | 9 | 1 | 1 | 2 | 14·4 | 3·20 | 19·4 | .. |
| 2 | Eye .. .. .. | 44 | .. | .. | .. | 70·5 | .. | 184·5 | .. |
| 3 | Ear .. .. .. | 1 | .. | .. | .. | 1·6 | .. | 7·4 | .. |
| 5 | Circulatory System.. | 8 | 2 | 2 | 4 | 12·8 | 6·40 | 13·4 | 1·49 |
| 8 | Respiratory „ .. | 47 | 1 | .. | 1 | 75·3 | 1·60 | 44·6 | .. |
| 9 | Digestive „ .. | 79 | .. | .. | .. | 126·6 | .. | 86·3 | .. |
| 10 | Urinary „ .. | 268 | 1 | .. | 1 | 429·5 | 1·60 | 317·0 | .. |
| 11 | Generative „ .. | 9 | .. | .. | .. | 14·4 | .. | 23·8 | .. |
| 12 | Organs of Locomotion | 1 | .. | .. | .. | 1·6 | .. | 1·5 | .. |
| 13 | Cellular Tissue .. | 11 | .. | .. | .. | 17·6 | .. | 26·8 | .. |
| 14 | Cutaneous System .. | 60 | .. | .. | .. | 96·2 | .. | 89·3 | .. |
| | III. *Conditions, &c.* Debility .. .. | 5 | .. | .. | .. | 8·0 | .. | .. | .. |
| | IV. *Poisons* .. | 20 | .. | .. | .. | 32·1 | .. | 23·8 | 1·49 |
| | V. *Injuries.* | | | | | | | | |
| 2 | Accidental .. .. | 80 | .. | .. | .. | 128·2 | .. | 132·4 | 1·49 |
| 4 | Self-inflicted .. | .. | .. | .. | .. | .. | .. | .. | 1·49 |
| | No Appreciable Disease .. .. | 4 | .. | .. | .. | 6·4 | .. | .. | .. |
| | Total .. .. | 968 | 9 | 3 | 12 | 1551·3 | 19·21 | 1398·8 | 8·93 |
| | Average of six years } 1864-9. | .. | .. | .. | .. | 1486·9 | 19·09 | .. | .. |

The ratio of admissions was higher than in 1869 by all classes of diseases except those of the nervous, circulatory and generative systems, the eye, the cellular tissue, debility and accidents, but the great excess was in those of the *urinary system*, particularly gonorrhœa, the admissions by which amounted to 385 per 1,000 of the strength.

*Eruptive Fevers.*—Small-pox broke out as an epidemic among the civil population of Yokohama in November, and extended to the British troops in

December, causing 11 admissions and three deaths, being in the ratio of 17·6 and 4·81 per 1,000 of the strength. *Japan.*

*Continued Fevers* were much more prevalent than in 1869, the admissions having amounted to 181 per 1,000, but without any deaths.

*Syphilis* was only slightly more prevalent than in the preceding year, but gave rise to the large number of 162 admissions, or 260 per 1,000 of the strength; 112 of the cases were returned as primary, and 50 as secondary syphilis.

*Diseases of the Eye*, although still very prevalent, show a marked reduction, the ratio of admissions having been three-fifths lower than in the preceding year. The cases almost all occurred in the first five months of the year. The decrease is attributed by the Medical Officer in charge to improvements in the barrack equipment.

*Diseases of the Digestive System.*—The increase in these was chiefly due to diarrhœa during the second half of the year. Hepatitis also was more prevalent, but there were no deaths by it.

*Diseases of the Cutaneous System* were a cause of considerable inefficiency, itch and ulcers being the two most prominent diseases.

Poisons.—There were 18 admissions by delirium tremens but no deaths. This gives the high ratio of 28·8 per 1,000 of the strength admitted for that disease. The other two cases were bites of a centipede and scorpion respectively.

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## *Section* II.

### *On the Extent of Invaliding.*

During the year there were 40 invalids of the European troops sent home from China, and 10 finally discharged the service at Netley, being in the ratio of 73·3 and 18·3 per 1,000 of mean strength. The former is considerably higher and the latter lower than the average of preceding years. There were 18 of the Asiatic troops, or 21·3 per 1,000 of the strength, sent as invalids to India during the year, being one-third under the average of the preceding six years. *China.*

Unfortunately the necessary information has not been received from Japan to enable us to include the invalding from it with that of China.

The following Table framed from Abstract, No. 19 in the Appendix, shows the causes of invaliding among both classes of the troops in China:—

*China.*

| | White Troops | | Asiatic Troops |
|---|---|---|---|
| Mean Strength .. .. .. .. | 546 | | 846 |
| | Sent as Invalids to England. | Discharged as Invalids in England. | Sent as Invalids to India. |
| Paroxysmal Fevers .. .. .. | 15 | 1 | 3 |
| Rheumatism .. .. .. .. | .. | 1 | 1 |
| Syphilis .. .. .. .. .. | 2 | .. | .. |
| Scrofula and Phthisis .. .. .. | 5 | 3 | .. |
| Beri-Beri .. .. .. .. .. | .. | .. | 2 |
| Diseases of the— | | | |
| Nervous System .. .. .. | 4 | .. | 3 |
| Eye and Ear .. .. .. .. | 3 | 1 | .. |
| Circulatory System .. .. .. | 2 | .. | .. |
| Absorbent „ .. .. .. | 1 | .. | .. |
| Respiratory „ .. .. .. | .. | 1 | 3 |
| Digestive „ .. .. .. | 4 | 2 | 5 |
| General Debility .. .. .. .. | 3 | 1 | 1 |
| Accidental Injuries .. .. .. | 1 | .. | .. |
| Total .. .. .. .. | 40 | 10 | 18 |
| Annual ratio per 1,000 of Mean Strength .. 1870 .. | 73·3 | 18·3 | 21·3 |
| Annual ratio per 1,000 of Mean Strength .. 1864–9 .. | 61·4 | 23·6 | 33·3 |

Diseases of the eye, which in former years were a fruitful source of invaliding caused only two men to be sent home and one finally discharged in 1870. Paroxysmal fevers were the most frequent cause of inefficiency among the European troops, but gave rise to only one discharge. Diseases of the stomach and bowels were the chief causes of disability among the Asiatic troops.

## *Section* III.

### *Mean Daily Sick.*

*China and Japan.*

The average number constantly sick among the European troops in China in 1870 was 42, in Japan 55, and among the Asiatic troops in China 35, being respectively in the ratio of 76·91, 88·14, and 41·37 per 1,000 of mean strength. The proportion in both classes of troops in China was much higher than in 1869, but in Japan it very slightly exceeded the ratio of that year.

The following Table gives the usual information, based on these numbers :—

| | European Force. | | Asiatic Force. |
|---|---|---|---|
| | China. | Japan. | China. |
| Ratio per 1,000 of Strength constantly Sick 1870.. | 76·91 | 88·14 | 41·37 |
| Ratio per 1,000 of Strength constantly Sick 1860–9 | 86·45 | 86·34 | 45·66 |
| | days. | days. | days. |
| Average Sick Time to each Soldier .. 1870.. | 28·08 | 32·17 | 15·10 |
| Average Sick Time to each Soldier .. 1860–9 | 31·56 | 31·57 | 16·67 |
| Average duration of Cases .. .. .. 1870.. | 13·99 | 21·31 | 12·65 |
| Average duration of Cases .. .. .. 1860–9 | 15·78 | 21·61 | 15·83 |

*China and Japan.*

The ratios have been under the average of the preceding five years among the troops, both European and Asiatic, in China, but have been slightly higher in Japan. The very high ratio in Japan in 1870 was chiefly due to three diseases, for syphilis furnished an average of 11·3, gonorrhœa of 12·4, and ophthalmia of 6·7 men constantly in hospital, or together 30·4 out of a total of 55 men.

*Straits Settlements.*

## XII.—STRAITS SETTLEMENTS.

### *Section* I.
### *Sickness and Mortality.*

STATISTICAL REPORT.

The garrison consisted of two Batteries of Royal Artillery, and the left wing of the 75th Regiment. Its average strength for the year was 571; the admissions into hospital were 770, and the deaths 5, including 2 of invalids at sea on their passage home. The admissions, therefore, were in the ratio of 1348, and the deaths of 8·75 per 1,000 of mean strength; both rather higher than in the preceding year, but the mortality nearly one-third under the average of the last six years.

The following Table, framed from Abstract No. 19 in the Appendix, shows the admissions and deaths by the different classes of diseases:—

| Orders. | Mean Strength, 571. Diseases. | Admissions. | Deaths. In Straits Settlements. | Deaths. Of Invalids. | Deaths. Total. | Annual Ratio per 1,000 of Strength. 1870. Admitted. | 1870. Died. | 1869. Admitted. | 1869. Died. |
|---|---|---|---|---|---|---|---|---|---|
| | I. *General Diseases.* | | | | | | | | |
| 1 | Febrile Group .. | 140 | .. | .. | .. | 245·2 | .. | 220·0 | .. |
| 2 | Constitutional „ .. | 70 | 1 | 1 | 2 | 122·5 | 3·50 | 122·0 | 1·85 |
| | II. *Local Diseases.* | | | | | | | | |
| | Diseases of the— | | | | | | | | |
| 1 | Nervous System .. | 16 | .. | .. | .. | 28·0 | .. | 14·8 | .. |
| 2 | Eye .. .. .. | 6 | .. | .. | .. | 10·5 | .. | 12·9 | .. |
| 3 | Ear .. .. .. | 8 | .. | .. | .. | 14·0 | .. | 12·9 | .. |
| 5 | Circulatory System.. | 22 | .. | 1 | 1 | 38·5 | 1·75 | 14·8 | .. |
| 6 | Absorbent „ .. | 15 | .. | .. | .. | 26 3 | .. | 9·2 | .. |
| 8 | Respiratory „ .. | 32 | 1 | .. | 1 | 56·0 | 1·75 | 40·7 | .. |
| 9 | Digestive „ .. | 203 | 1 | .. | 1 | 355·5 | 1·75 | 236·6 | 1·85 |
| 10 | Urinary „ .. | 57 | .. | .. | .. | 99·8 | .. | 125·7 | .. |
| 11 | Generative „ .. | 19 | .. | .. | .. | 33·3 | .. | 25·9 | .. |
| 12 | Organs of Locomotion | 1 | .. | .. | .. | 1·8 | .. | 3·7 | .. |
| 13 | Cellular Tissue .. | 11 | .. | .. | .. | 19·3 | .. | 42·5 | .. |
| 14 | Cutaneous System .. | 61 | .. | .. | .. | 106·8 | .. | 110·9 | .. |
| | IV. *Poisons.* .. | 5 | .. | .. | .. | 8·7 | .. | 16·6 | 1·85 |
| | V. *Injuries.* | | | | | | | | |
| 2 | Accidental .. .. | 101 | .. | .. | .. | 176·9 | .. | 122·0 | .. |
| 4 | Self-inflicted .. | 1 | .. | .. | .. | 1·8 | .. | .. | .. |
| | VI. *Surgical Operations* .. .. | 1 | .. | .. | .. | 1·8 | .. | .. | .. |
| | No appreciable disease .. | 1 | .. | .. | .. | 1·8 | .. | .. | .. |
| | Total .. .. | 770 | 3 | 2 | 5 | 1348·5 | 8·75 | 1131·2 | 5·55 |
| | Average of six years 1864–9 | .. | .. | .. | .. | 1400·9 | 12·21 | .. | .. |

GENERAL DISEASES.—There was a slight increase in the prevalence of the febrile group, confined entirely to cases of ague. The ratio of admissions by the constitutional group was identical in the two years. Syphilis was the cause of 85 admissions per 1,000 of mean strength. *Straits Settlements.*

LOCAL DISEASES.—There was an increase in the admissions by *Diseases of the Nervous System*, chiefly in cases of neuralgia, and by those of the *Circulatory System*, particularly palpitation. *In Diseases of the Digestive System*, there was a marked decrease in dysentery and diarrhœa, which however was more than counterbalanced by an increase in dyspepsia and hepatitis. *In Diseases of the Urinary System* there was a decrease in gonorrhœa and bubo, and in *Accidental Injuries* there was a considerable excess of cases of slight wounds and contusions.

## *Section* II.

### *On the Extent of Invaliding.*

There were 32 invalids sent to England during the year, and 25 finally discharged the service at Netley, being respectively in the ratio of 56·0 and 43·8 per 1,000 of the strength, and about thrice as high as in the preceding year. The following is a classified summary of the disabilities for which the invalids were sent to England, and of those of the men finally discharged at Netley :—

| Disabilities. | Invalids. | |
|---|---|---|
| | Sent Home. | Discharged at Netley. |
| Ague .. .. .. .. | 1 | .. |
| Rheumatism .. .. .. | 2 | .. |
| Secondary Syphilis.. .. .. | 2 | .. |
| Phthisis .. .. .. .. | 2 | 5 |
| Anæmia .. .. .. .. | .. | 2 |
| Diseases of the— | | |
| Nervous System .. .. | 2 | 1 |
| Circulatory „ .. .. | 10 | 12 |
| Respiratory „ .. .. | 2 | 1 |
| Digestive „ .. .. | 7 | 4 |
| Generative „ .. .. | 2 | .. |
| Cellular Tissue .. .. .. | 1 | .. |
| Debility .. .. .. .. | 1 | .. |
| Total .. .. .. | 32 | 25 |
| Ratio per 1,000 of mean strength .. .. 1870 | 56·0 | 43·8 |
| Ratio per 1,000 of mean strength .. .. 1868-9 | 23·5 | 17·9 |

Diseases of the circulatory system were the most frequent cause both of invaliding home and of discharge; half the cases were returned as palpitation. Next in frequency were diseases of the digestive system, principally hepatic affections, and consumption ranked high among the causes of final discharge.

## *Section* III.

### *Mean Daily Sick.*

The average number constantly non-effective from sickness during the year amounted to 35, or 61·29 per 1,000 of mean strength, being considerably higher than in the preceding year. The average sick time to each soldier was 22·18 days, and the average duration of the cases 16·59 days, both also considerably above the previous results.

## XIII.—ON THE HEALTH OF THE TROOPS SERVING IN INDIA.

### *Section* I.

### *Sickness and Mortality.*

*India.* During the year 1870, the average strength of the European troops serving in the Indian Commands was 55,380 non-commissioned officers and men; the admissions into hospital were 89,898, and the deaths 1,266 including 117 among the invalids on their passage home or at Netley while awaiting their discharge. These numbers give the ratio of 1623 admissions and 22·86 deaths per 1,000 of mean strength, the former slightly above, but the latter more than 14 per 1,000 under the ratio of the preceding year. The admissions have been very little above the average of the last ten years, and the deaths have been 5·13 below that average.

Before showing the sickness and mortality in each of the three Commands separately, it appears necessary to allude to the history of the 1st Battalion 21st Regiment. In the Report for 1869, it was shown that this corps arrived at Kurrachee from England in the end of March; that continued fevers shortly afterwards prevailed to a great extent, succeeded by paroxysmal fevers, which continued to be a source of great inefficiency till the end of the year. As there appeared to be little or no improvement in the condition of the regiment, which was completely disabled by the prevalence of fevers, the authorities decided early in January to remove it from Kurrachee to Bangalore, in the hope that the change to so healthy a station would soon restore its efficiency. It accordingly embarked at Kurrachee on the 15th and arrived at Beypore on the 21st, and after a rest of two days proceeded by rail to Bangalore, where it remained during the remainder of the year. It would be obviously unfair to include in the general return of the troops in Madras the sickness and mortality of a corps which had been sent to it as a sanatorium, and could not be considered in any way as effective till late in the year; while an objection might be made to its being included with the troops in Bombay, when no longer borne on the strength of that Presidency, although the disease by which it was rendered non-effective had been contracted there. It has been considered better, therefore, to keep the statistics of this corps separate from those of both Presidencies, but to include them in the general statement of the sickness and mortality in India.

The following table shows the sickness and mortality during the year in the different Presidencies, and in the 1st Battalion 21st Regiment:—

| | Average Strength. | Admissions into Hospital. | Deaths. | | | Ratio per 1,000 of Mean Strength. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1870. | | 1860–69. | |
| | | | In India. | Of Invalids. | Total. | Admitted. | Died. | Admitted. | Died. |
| Bengal .. .. | 34,090 | 57,777 | 757 | 60 | 817 | 1,695 | 23·96 | 1,673 | 31·27 |
| Madras .. .. | 9,936 | 12,728 | 209 | 26 | 235 | 1,281 | 23·65 | 1,389 | 22·53 |
| 1st Bn. 21st Reg. | 797 | 3,173 | 13 | 5 | 18 | 3,981 | 22·59 | .. | .. |
| Bombay .. .. | 10,557 | 16,220 | 170 | 28 | 198 | 1,536 | 18·73 | 1,521 | 22·58 |

The admissions in Bengal and Bombay were slightly above, but in Madras, excluding the 1st Battalion 21st Regiment, considerably below the average of the preceding ten years; the deaths in Madras were slightly above, and in Bengal and Bombay, but particularly the former, considerably under the average.

## I. BENGAL.

### STATISTICAL REPORT.

*Bengal.*

The average strength of the troops during the year was 34,090; the admissions into hospital were 57,777, and the deaths, including 60 of invalids, were 817, the former being in the ratio of 1,695, and the latter of 23·96 per 1,000 of mean strength. The admissions correspond very closely with, and the deaths have been little more than, half the proportion of the preceding year.

The following Table shows the influence of the different classes of diseases in causing this sickness and mortality; the details will be found in Abstract No. 20 in the Appendix.

| Orders. | Diseases. | Strength, 34,090. | | | | Ratio per 1,000 of Mean Strength. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Deaths. | | | 1870. | | 1869. | |
| | | Admitted. | In the Command. | Of Invalids. | Total. | Admitted. | Died. | Admitted. | Died. |
| | *General Diseases.* | | | | | | | | |
| 1 | Febrile Group .. | 28,047 | 174 | 1 | 175 | 822·7 | 5·13 | 771·8 | 21·27 |
| 2 | Constitutional Group | 6,155 | 64 | 19 | 83 | 180·6 | 2·43½ | 167·3 | 3·27 |
| | *Local Diseases.* | | | | | | | | |
| | Diseases of the— | | | | | | | | |
| 1 | Nervous System .. | 602 | 72 | 3 | 75 | 17·7 | 2·20 | 26·3 | 4·55 |
| 2 | Eye .. .. .. | 870 | .. | .. | .. | 25·5 | .. | 25·9 | .. |
| 3 | Ear .. .. .. | 258 | .. | .. | .. | 7·6 | .. | 6·1 | .. |
| 4 | Nose .. .. .. | 29 | .. | .. | .. | ·8 | .. | ·7 | .. |
| 5 | Circulatory System .. | 534 | 58 | 3 | 61 | 15·7 | 1·79 | 13·9 | 1·71 |
| 6 | Absorbent „ .. | 608 | .. | .. | .. | 17·8 | .. | 14·3 | .. |
| 7 | Ductless Glands .. | 4 | 1 | .. | 1 | ·1 | ·03 | ·1 | .. |
| 8 | Respiratory System .. | 1,899 | 54 | 12 | 66 | 55·7 | 1·94 | 47·2 | ·94 |
| 9 | Digestive „ .. | 8,497 | 243 | 20 | 263 | 249·3 | 7·71 | 291·4 | 9·89 |
| 10 | Urinary „ .. | 3,420 | 18 | 2 | 20 | 100·3 | ·59 | 103·7 | ·51 |
| 11 | Generative „ .. | 550 | .. | .. | .. | 16·1 | .. | 15·2 | .. |
| 12 | Organs of Locomotion | 170 | .. | .. | .. | 5·0 | .. | 5·2 | ·03 |
| 13 | Cellular Tissue .. | 389 | 5 | .. | 5 | 11·4 | ·15 | 10·5 | ·03 |
| 14 | Cutaneous System .. | 2,173 | 1 | .. | 1 | 63·7 | ·03 | 78·5 | .. |
| | III. *Conditions, &c.* | | | | | | | | |
| | Debility .. .. | 484 | 4 | .. | 4 | 14·2 | ·12 | 13·2 | ·17 |
| | IV. *Poisons* .. | 203 | 10 | .. | 10 | 6·0 | ·29 | 7·2 | ·68 |
| | V. *Injuries.* | | | | | | | | |
| 2 | Accidental .. .. | 2,844 | 36 | .. | 36 | 83·4 | 1·05 | 88·3 | ·68 |
| 3 | Homicidal .. .. | .. | 1 | .. | 1 | .. | ·03 | ·1 | ·11 |
| 4 | Self-inflicted .. .. | 9 | 15 | .. | 15 | ·3 | ·44 | ·4 | ·74 |
| 5 | Judicial .. .. | .. | .. | .. | .. | .. | .. | .. | ·03 |
| | VI. *Surgical Operations* | 11 | 1 | .. | 1 | ·3 | ·03 | ·1 | .. |
| | No appreciable disease | 21 | .. | .. | .. | ·6 | .. | 1·1 | .. |
| | Total .. .. | 57,777 | 757 | 60 | 817 | 1694·8 | 23·96 | 1688·5 | 44·61 |
| | Average of 10 years 1860–9 .. .. | .. | .. | .. | .. | 1673·4 | 31·27 | .. | .. |

*Bengal.* GENERAL DISEASES.—The ratio of admissions was 64 per 1,000 higher than in 1869, but that of the deaths was two-thirds lower than in that year. The increase of the former and decrease of the latter were chiefly in the febrile group.

The following Table shows the prevalence and mortality of the principal diseases in this class :—

| General Diseases. | Admitted. | Died. | Ratio per 1,000 of Mean Strength. | | | |
|---|---|---|---|---|---|---|
| | | | 1870. | | 1869. | |
| | | | Admitted. | Died. | Admitted. | Died. |
| *Febrile*— | | | | | | |
| Eruptive Fevers.. .. | 29 | 5 | ·9 | ·15 | 3·9 | ·40 |
| Continued „ .. .. | 6,004 | 76 | 176·1 | 2·23 | 197·6 | 1·99 |
| Paroxysmal „ .. .. | 21,812 | 66 | 639·8 | 1·93 | 541·6 | 3·32 |
| Malignant Cholera .. | 49 | 21 | 1·4 | ·61 | 22·5 | 15·32 |
| Influenza.. .. .. | 79 | .. | 2·3 | .. | 2·0 | .. |
| Erysipelas .. .. | 56 | 2 | 1·7 | ·06 | 1·5 | ·09 |
| Other Diseases .. .. | 18 | 5 | ·5 | ·15 | 2·7 | ·09 |
| *Constitutional*— | | | | | | |
| Rheumatism .. .. | 1,945 | .. | 57·0 | .. | 50·5 | ·06 |
| Syphilis .. .. .. | 3,433 | 12 | 100·7 | ·35 | 93·0 | ·11 |
| Scrofula, Phthisis, &c. .. | 399 | 62 | 11·7 | 1·82 | 13·9 | 2·90 |
| Scurvy and Purpura .. | 30 | .. | ·9 | .. | ·6 | .. |
| Anæmia .. .. .. | 315 | .. | 9·2 | .. | 8·2 | ·11 |
| Other Diseases .. .. | 26 | 8 | ·8 | ·23 | 1·1 | ·09 |

*Euruptive fevers* were much less prevalent than in 1869. There were only 29 admissions by them throughout the whole Command, and of these 21 were cases of small-pox. This disease did not prevail as an epidemic anywhere among the European troops; but the proportion of deaths to cases was unusually high, having amounted to 24 per cent. or nearly one in four.

*Continued fevers* also were less prevalent but more fatal than in 1869, the admissions showing a decrease of 21, and the deaths an increase of ·24 per 1,000 of the strength.

*Paroxysmal fevers* were very much more prevalent but less fatal than in 1869. They gave rise to nearly two-fifths of all the admissions into hospital, and the ratio was higher than in any of the preceding ten years. The rate of deaths, however, was lower than in six of the ten years, and was identical with that for 1866.

*Malignant cholera.*—The troops enjoyed a marked exemption from this formidable disease, the admissions and deaths having been lower than in any of the ten preceding years.

*Rheumatism* was more prevalent than in 1869, though still considerably under the average of the last ten years: the increase was in the chronic cases.

*Syphilis* also shows an increase upon the results of the preceding year though still one-sixth under the previous average.

*Scrofula, Phthisis, &c.*, furnished a lower ratio than in 1869, both of admissions and deaths, the former was slightly above, but the latter one-fourth under the average of the last ten years.

LOCAL DISEASES.—There was a very considerable decrease in *diseases of the nervous system*, and the mortality by them was less than half the amount in 1869. The decrease was chiefly in apoplexy and sunstroke, and in the admissions also by paralysis, neuralgia and mental disease.

The ratio of admissions by *diseases of the eyes* was identical in the two years; that by diseases of the circulatory system shows a slight increase in

1870, but the excess was entirely in cases of palpitation of the heart, in which no organic disease of the organ could be ascertained. *Bengal.*

*Diseases of the Respiratory System* were more prevalent and fatal than in 1869; the increase being in bronchitis and pneumonia; the mortality of the latter was thrice as high as in the preceding year.

*Diseases of the Digestive System* were both less prevalent and less fatal than in 1869, but were still a very important cause of sickness and mortality, having given rise to upwards of one-seventh of the admissions, and nearly one-third of the deaths in the Command. The decrease was most marked in dysentery and diarrhœa, and, as regards the admissions, also in dyspepsia. There was an increase in the admissions by tonsillitis, hepatitis and splenitis, but the deaths by hepatitis were lower than in the preceding year.

There was a slight reduction in the prevalence of *Diseases of the Urinary System*, the difference being chiefly in gonorrhœa and its consequences, and a very considerable reduction in *those of the Cutaneous System*, particularly ulcers and boils.

INJURIES.—There was an increase in the proportion of deaths under accidental injuries, chiefly in those by drowning and concussion of the brain. Self-inflicted injuries were considerably under the ratio of the preceding year. There were only 15 deaths so returned; of these 8 were by gunshot, 4 by drowning, 1 by hanging, 1 by cut throat, and 1 by fracture.

The admissions and deaths at each of the principal stations in the Command are shown in the following Table :—

| Stations. | | Average Annual Strength. | Admitted into Hospital. | Died in India. | Annual Ratio per 1,000. 1870. Admitted. | 1870. Died. | 1865-9. Admitted. | 1865-9. Died. |
|---|---|---|---|---|---|---|---|---|
| Presidency | Calcutta .. | 865 | 1,122 | 14 | 1290·2 | 16·18 | 1511·6 | 27·36 |
| | Dum-Dum .. | 607 | 627 | 13 | 1032·9 | 21·42 | | |
| | Barrackpore .. | 423 | 514 | 8 | 1215·1 | 18 91 | 1829·1 | 37·59 |
| | Berhampore .. | 73 | 81 | 1 | 1109·6 | 13·70 | 2257·9 | 43·74 |
| | Hazareebaugh.. | 750 | 728 | 16 | 970·6 | 21·33 | 1520·3 | 18·69 |
| | Darjeeling .. | 64 | 121 | 1 | 1890·6 | 15·62 | .. | .. |
| Allahabad | Allahabad .. | 395 | 628 | 7 | 1588·9 | 17·72 | 1800·9 | 56·73 |
| | Cawnpore .. | 751 | 1,334 | 16 | 1776·3 | 21·31 | 1339·3 | 22·70 |
| | Dinapore .. | 836 | 1,034 | 27 | 1236·8 | 32·30 | 1573·6 | 22·39 |
| | Benares .. | 517 | 724 | 8 | 1399·6 | 15·47 | 1864·6 | 30·06 |
| | Chunar .. | 64 | 152 | 4 | 2375·0 | 62·50 | .. | .. |
| Oude .. | Lucknow .. | 2,186 | 3,124 | 58 | 1429·1 | 26·53 | 1217·9 | 48·28 |
| | Seetapore .. | 525 | 624 | 4 | 1188·6 | 7·62 | 1118·7 | 21·54 |
| | Fyzabad .. | 811 | 1,041 | 24 | 1283·6 | 29·59 | 1096·1 | 29·12 |
| | Roy Bareilly .. | 59 | 46 | 3 | 779·7 | 50·85 | .. | .. |
| Saugor .. | Saugor.. .. | 931 | 1,911 | 17 | 2052·6 | 18·26 | 2262·0 | 32·14 |
| | Nowgong .. | 179 | 339 | 3 | 2173·2 | 16·76 | 1113·7 | 26·07 |
| | Jubbulpore .. | 628 | 1,598 | 31 | 2544·6 | 49·36 | 2145·3 | 32·27 |
| Rohilcund | Bareilly .. | 835 | 671 | 11 | 803·6 | 13·17 | 1003·6 | 13·29 |
| | Shahjehanpore | 545 | 657 | 4 | 1205·5 | 7·34 | 1348·8 | 25·67 |
| | Moradabad .. | 269 | 251 | 5 | 933·1 | 18·59 | 1081·4 | 15·87 |
| | Seanee.. .. | .. | .. | .. | .. | .. | .. | .. |
| Gwalior | Morar .. .. | 876 | 1,640 | 30 | 1872·1 | 34·25 | 2480·7 | 50·93 |
| | Fortress Gwalior | 288 | 421 | 4 | 1461·8 | 13·89 | 1359·7 | 35·52 |
| | Jhansi.. .. | 483 | 1,429 | 9 | 2958·6 | 18·63 | 2308·6 | 21·32 |
| | Seepree .. | 89 | 338 | 1 | 3797·7 | 11·24 | 1797·7 | 15·27 |

*Bengal.*

| Stations. | | Average Annual Strength. | Admitted into Hospital. | Died in India. | Annual Ratio per 1,000. 1870. Admitted. | 1870. Died. | 1865–9. Admitted. | 1865–9. Died. |
|---|---|---|---|---|---|---|---|---|
| Meerut .. | Meerut .. | 1,207 | 2,109 | 35 | 1747·3 | 29·00 | 1540·0 | 35·39 |
| | Agra .. .. | 675 | 1,274 | 12 | 1887·4 | 17·75 | 1337·2 | 20 87 |
| | Delhi .. .. | 312 | 516 | 10 | 1653·8 | 30·05 | 1842·8 | 27·79 |
| | Muttra .. | 358 | 421 | 2 | 1176·0 | 5·59 | 1045·9 | 16·66 |
| | Roorkee .. | 264 | 431 | 4 | 1632·6 | 15·15 | 1396·0 | 19·32 |
| | Futtyghur .. | 224 | 314 | 3 | 1401·8 | 13·39 | 1302·6 | 21·31 |
| Sirhind .. | Umballa .. | 1,250 | 1,877 | 23 | 1501·6 | 18·40 | 1402·7 | 16·27 |
| | Jullundur .. | 641 | 1,577 | 9 | 2460·2 | 14·04 | 1750·1 | 23·45 |
| | Dugshai .. | 784 | 520 | 5 | 663·2 | 6·37 | 885·0 | 9 07 |
| | Subathoo .. | 698 | 574 | 8 | 822·3 | 11·46 | 1473·5 | 24·29 |
| | Jutogh .. .. | 65 | 32 | .. | 492·3 | .. | .. | .. |
| | Chuckratta .. | 784 | 761 | 14 | 970·7 | 17·86 | .. | .. |
| Lahore .. | Meean Meer .. | 905 | 2,458 | 25 | 2716·0 | 27·62 | 2097·8 | 32·25 |
| | Fort Lahore .. | 67 | 178 | 3 | 2656 7 | 44·78 | | |
| | Umritsur .. .. | 121 | 338 | 5 | 2793·4 | 41·31 | 1453·4 | 21·56 |
| | Fort Kangra .. | 10 | 7 | 1 | 700·0 | 100·00 | 1142·9 | 21·56 |
| | Ferozepore .. | 914 | 1,503 | 23 | 1644·4 | 30·63 | 1577 9 | 14·16 |
| | Mooltan .. | 811 | 1,480 | 18 | 1824·9 | 22·19 | 1278·7 | 21·15 |
| | Dalhousie .. | 257 | 461 | 3 | 1793·8 | 11·63 | .. | .. |
| | Bhagsoo .. | 61 | 100 | 1 | 1639·3 | 16·39 | .. | .. |
| Peshawur.. | Peshawur .. | 1,904 | 7,747 | 64 | 4068·8 | 33·61 | 2311·0 | 62·13 |
| | Nowshera .. | 475 | 1,430 | 10 | 3010·5 | 21·05 | 1485·9 | 22·88 |
| Jhelum .. | Sealkote .. | 959 | 1,586 | 18 | 1653·8 | 18·77 | 1246·1 | 8·55 |
| | Rawul Pindee.. | 1,457 | 3,118 | 35 | 2140·0 | 24·02 | 1563·6 | 12·05 |
| | Working Parties | 293 | 575 | 1 | 1962 4 | 3·41 | .. | .. |
| | Cambellpore .. | 90 | 184 | 2 | 2044·4 | 22·22 | 1189·8 | 17·11 |
| | Attock .. .. | 146 | 376 | 7 | 2575·3 | 47·94 | 1986·8 | 20·33 |
| | Dera Ismail Khan | 96 | 171 | 3 | 1781·2 | 31·25 | 1180·2 | 7·92 |
| Troops on March, detached, &c. | | 1,986 | 1,884 | 61 | 948·6 | 30·71 | .. | .. |
| Convalescent Stations and Depôt Hospitals .. | | 1,285 | 2,714 | 28 | 2112·0 | 21·79 | .. | .. |

The admissions into hospital were extremely high at Peshawur and Nowshera. They were also much above the average of the Command and of preceding years at Jhansi, Meean Meer and Fort Lahore, Umritsur, Jubbulpore, and at Jullundur. The mortality was highest, omitting the small stations, at Jubbulpore; it was also very high at Umritsur, and considerably above the average of the Command at Morar, Peshawur, Dinapore, Ferozepore, Fyzabad, Delhi, and Meerut; it was also above the average of the five preceding years at all of these except Peshawur, Meerut, and Morar.

The following Tables show the admissions and deaths by the different classes of diseases in each of the Military Divisions and Districts:—

| Order. | Stations ... ... ... | Presidency. | | Allahabad. | | Oude. | | Saugor. | | Rohilcund. | | Gwalior. | | Meerut. | | Sirhind. | | Lahore. | | Jhelum. | | Peshawur. | | Depôts. | | On the March. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Strength ... ... ... | 2,782 | | 2,564 | | 3,581 | | 1,738 | | 1,649 | | 1,736 | | 3,041 | | 4,222 | | 3,147 | | 3,042 | | 2,379 | | 1,284 | | 1,986 | |
| | Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| | I. *General Diseases.* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Febrile Group ... ... | 903 | 14 | 956 | 14 | 1,295 | 35 | 2,355 | 13 | 337 | ... | 2,055 | 5 | 2,118 | 13 | 2,143 | 6 | 3,570 | 20 | 3,665 | 19 | 6,947 | 26 | 929 | 1 | 730 | 12 |
| 2 | Constitutional ,, ... ... | 441 | 3 | 621 | 3 | 738 | 7 | 354 | 4 | 311 | ... | 362 | 4 | 614 | 7 | 678 | 8 | 498 | 3 | 405 | 9 | 348 | 4 | 510 | 3 | 264 | 7 |
| | II. *Local Diseases.* Diseases of the— | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Nervous System ... ... | 54 | 3 | 51 | 7 | 38 | 5 | 24 | 5 | 16 | ... | 51 | 6 | 61 | 7 | 78 | 4 | 84 | 15 | 52 | 5 | 46 | 10 | 45 | 2 | 29 | 2 |
| 2 | Eye ... ... ... ... | 65 | ... | 90 | ... | 169 | ... | 24 | ... | 33 | ... | 62 | ... | 88 | ... | 73 | ... | 81 | ... | 85 | .. | 41 | ... | 25 | ... | 31 | ... |
| 3 | Ear ... ... .. ... | 32 | ... | 32 | ... | 36 | ... | 17 | ... | 8 | ... | 15 | ... | 17 | ... | 23 | ... | 20 | ... | 21 | ... | 25 | ... | 5 | ... | 3 | ... |
| 4 | Nose ... ... ... ... | 3 | ... | 3 | ... | 2 | ... | 2 | ... | ... | ... | ... | ... | 1 | ... | 4 | ... | ... | ... | 6 | ... | 2 | ... | 7 | ... | 1 | ... |
| 5 | Circulatory System ... ... | 12 | 5 | 39 | 3 | 43 | 5 | 26 | 2 | 23 | 2 | 38 | 4 | 47 | 3 | 62 | 10 | 62 | 9 | 38 | 4 | 99 | 4 | 30 | 1 | 3 | 5 |
| 6 | Absorbent ,, ... ... | 56 | ... | 71 | ... | 102 | ... | 43 | ... | 38 | ... | 32 | ... | 33 | ... | 46 | ... | 31 | ... | 47 | ... | 21 | ... | 38 | ... | 17 | ... |
| 7 | Ductless Glands ... ... | ... | ... | 2 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 2 | ... | ... | ... | ... | ... |
| 8 | Respiratory System ... ... | 88 | 2 | 110 | 2 | 120 | 3 | 93 | 1 | 30 | ... | 83 | 1 | 152 | 7 | 316 | 6 | 172 | 7 | 174 | 3 | 402 | 12 | 104 | 3 | 80 | 3 |
| 9 | Digestive ,, ... ... | 723 | 16 | 831 | 27 | 897 | 28 | 457 | 17 | 328 | 14 | 472 | 16 | 828 | 24 | 791 | 14 | 909 | 17 | 680 | 16 | 655 | 15 | 688 | 18 | 282 | 19 |
| 10 | Urinary ,, ... ... | 252 | 3 | 510 | ... | 523 | 1 | 174 | 3 | 215 | ... | 244 | 1 | 313 | ... | 300 | ... | 327 | 4 | 226 | 4 | 113 | ... | 99 | ... | 203 | 3 |
| 11 | Generative ,, ... ... | 60 | ... | 44 | ... | 65 | ... | 28 | ... | 15 | ... | 29 | ... | 73 | ... | 49 | ... | 41 | ... | 64 | ... | 40 | ... | 21 | ... | 29 | ... |
| 12 | Organs of Locomotion ... | 8 | 1 | 21 | ... | 10 | ... | 9 | ... | 10 | ... | 17 | ... | 24 | ... | 17 | ... | 23 | ... | 15 | ... | 22 | ... | 12 | ... | 10 | ... |
| 13 | Cellular Tissue ... ... | 29 | 2 | 40 | ... | 53 | ... | 15 | ... | 30 | ... | 15 | ... | 36 | ... | 30 | ... | 46 | 1 | 27 | 1 | 32 | ... | 24 | ... | 15 | ... |
| 14 | Cutaneous System ... ... | 161 | ... | 178 | ... | 341 | ... | 123 | ... | 57 | ... | 143 | ... | 230 | ... | 232 | 1 | 278 | ... | 167 | ... | 121 | ... | 58 | ... | 64 | ... |
| | III. *Conditions, &c.* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Debility ... ... ... | 55 | ... | 39 | ... | 56 | ... | 13 | ... | 31 | ... | 25 | ... | 43 | ... | 41 | ... | 33 | ... | 44 | ... | 51 | 1 | 35 | ... | 18 | 1 |
| | IV. *Poisons.* | 11 | ... | 27 | 1 | 17 | ... | 4 | ... | 12 | ... | 15 | 2 | 24 | 2 | 26 | 1 | 34 | 2 | 14 | 2 | 13 | ... | 2 | ... | 3 | 2 |
| | V. *Injuries.* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Accidental ... ... ... | 237 | ... | 194 | 3 | 324 | 4 | 126 | 5 | 83 | 2 | 166 | 5 | 358 | 2 | 418 | 8 | 311 | 2 | 276 | 2 | 189 | 1 | 75 | ... | 101 | 1 |
| 3 | Homicidal ... ... ... | .. | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 4 | Self-inflicted ... ... ... | ... | 3 | ... | 2 | ... | 1 | ... | 1 | 1 | 1 | ... | ... | 1 | 1 | ... | 1 | 1 | 4 | ... | 1 | 2 | 1 | ... | ... | 1 | 1 |
| | VI. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Surgical Operations ... ... | 2 | ... | 3 | ... | ... | ... | 2 | ... | 1 | 1 | 2 | ... | ... | ... | 1 | ... | 1 | ... | 4 | ... | ... | ... | ... | ... | ... | ... |
| | No appreciable disease ... | 1 | ... | 10 | ... | 6 | ... | 3 | ... | ... | ... | 2 | ... | 4 | ... | 13 | ... | 4 | ... | 1 | ... | 8 | ... | 5 | ... | 1 | ... |
| | Total ... ... ... | 3,193 | 53 | 3,872 | 62 | 4,835 | 89 | 3,897 | 51 | 1,579 | 20 | 3,828 | 41 | 5,065 | 66 | 5,341 | 59 | 6,526 | 84 | 6,011 | 66 | 9,177 | 74 | 2,714 | 28 | 1,884 | 61 |

Ratio per 1,000 of Mean Strength.

| Order. | Stations / Diseases. | Presidency. Admitted. | Presidency. Died. | Allahabad. Admitted. | Allahabad. Died. | Oude. Admitted. | Oude. Died. | Saugor. Admitted. | Saugor. Died. | Rohilcund. Admitted. | Rohilcund. Died. | Gwalior. Admitted. | Gwalior. Died. | Meerut. Admitted. | Meerut. Died. | Sirhind. Admitted. | Sirhind. Died. | Lahore. Admitted. | Lahore. Died. | Jhelum. Admitted. | Jhelum. Died. | Peshawur. Admitted. | Peshawur. Died. | Depôts. Admitted. | Depôts. Died. | On the March. Admitted. | On the March. Died. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1. *General Diseases.* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Febrile Group ... | 324·6 | 5·03 | 372·8 | 5·46 | 361·6 | 9·77 | 1355·0 | 7·47 | 204·4 | ... | 1183·8 | 2·88 | 696·5 | 4·27 | 507·6 | 1·42 | 1134·5 | 6·35 | 1204·8 | 6·25 | 2920·1 | 10·93 | 723·5 | ·78 | 367·6 | 6·04 |
| 2 | Constitutional „ ... | 158·5 | 1·08 | 242·2 | 1·17 | 206·1 | 1·95 | 203·7 | 2·30 | 188·6 | ... | 208·5 | 2·30 | 201·9 | 2·30 | 160·6 | 1·90 | 158·3 | ·95 | 133·1 | 2·96 | 146·4 | 1·68 | 397·2 | 2·34 | 141·5 | 3·52 |
| | II. *Local Diseases.* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Diseases of the— | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Nervous System ... | 19·4 | 1·08 | 19·9 | 2·73 | 10·6 | 1·40 | 13·8 | 2·88 | 9·7 | ... | 29·4 | 3·46 | 20·1 | 2·30 | 18·5 | ·94 | 26·7 | 4·77 | 17·1 | 1·64 | 19·3 | 4·20 | 35·0 | 1·56 | 6·0 | 1·01 |
| 2 | Eye ... ... ... | 23·4 | ... | 35·1 | ... | 47·2 | ... | 13·8 | ... | 20·0 | .... | 35·7 | ... | 28·9 | ... | 17·3 | ... | 25·7 | ... | 27·9 | ... | 17·2 | ... | 19·5 | ... | 15·6 | ... |
| 3 | Ear ... ... ... | 11·5 | ... | 12·5 | ... | 10·1 | ... | 9·8 | ... | 4·9 | ... | 8·6 | ... | 5·6 | .. | 5·4 | ... | 6·4 | ... | 6·9 | ... | 10·5 | ... | 3·9 | ... | 1·5 | ... |
| 4 | Nose ... ... ... | 1·1 | ... | 1·2 | ... | ·6 | ... | 1·2 | ... | ... | ... | ... | ... | ·3 | ... | ·9 | ... | ... | ... | 2·0 | ... | ·8 | ... | 5·4 | ... | ·5 | ... |
| 5 | Circulatory System ... | 4·3 | 1·79 | 15·2 | 1·17 | 12·0 | 1·40 | 14·9 | 1·15 | 13·9 | 1·21 | 21·9 | 2·30 | 15·5 | ·99 | 14·7 | 2·37 | 19·7 | 2·86 | 12·5 | 1·31 | 41·6 | 1·68 | 23·4 | ·78 | 1·5 | 2·52 |
| 6 | Absorbent „ ... | 20·1 | ... | 27·7 | ... | 28·5 | ... | 24·7 | ... | 23·0 | ... | 18·4 | ... | 10·9 | ... | 10·9 | ... | 9·9 | ... | 15·5 | ... | 8·8 | ... | 29·6 | ... | 8·6 | ... |
| 7 | Ductless Glands ... | ... | ... | ·8 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1·5 | ... | ... | ... |
| 8 | Respiratory System ... | 31·6 | ·72 | 42·9 | ·78 | 33·5 | ·84 | 53·5 | ·58 | 18·2 | ... | 47·8 | ·58 | 50·0 | 2·30 | 74·8 | 1·42 | 54·7 | 2·22 | 57·2 | ·99 | 169·0 | 5·05 | 81·0 | 2·33 | 40·3 | 4·03 |
| 9 | Digestive „ ... | 259·9 | 5·75 | 324·1 | 10·53 | 250·5 | 7·82 | 262·9 | 9·78 | 198·9 | 8·48 | 271·9 | 9·22 | 272·3 | 7·89 | 187·4 | 3·31 | 288·9 | 5·40 | 223·5 | 5·26 | 275·3 | 6·31 | 535·8 | 14·02 | 142·0 | 9·57 |
| 10 | Urinary „ ... | 90·6 | 1·08 | 198·9 | ... | 146·0 | ·28 | 100·1 | 1·72 | 130·4 | ... | 140·6 | ·58 | 102·9 | ... | 71·1 | ... | 103·9 | 1·27 | 74·3 | 1·31 | 47·5 | ... | 77·1 | ... | 101·7 | 1·51 |
| 11 | Generative „ ... | 21·6 | ... | 17·2 | ... | 18·2 | ... | 16·1 | ... | 9·1 | ... | 16·7 | ... | 24·0 | ... | 11·6 | ... | 13·0 | ... | 21·0 | ... | 16·8 | ... | 16·3 | ... | 14·6 | ... |
| 12 | Organs of Locomotion | 2·9 | ·36 | 8·2 | ... | 2·8 | ... | 5·2 | ... | 6·1 | ... | 9·8 | ... | 7·9 | ... | 4·0 | ... | 7·3 | ... | 4·9 | ... | 9·3 | ... | 9·3 | ... | 5·0 | ... |
| 13 | Cellular Tissue ... | 10·4 | ·72 | 15·6 | ... | 14·8 | ... | 8·6 | ... | 18·2 | ... | 8·6 | ... | 11·8 | .. | 7·1 | ... | 14·6 | ·32 | 8·9 | ·33 | 13·5 | ... | 18·7 | ... | 7·5 | ... |
| 14 | Cutaneous System ... | 57·9 | ... | 69·4 | ... | 95·2 | ... | 73·6 | ... | 34·6 | ... | 82·4 | ... | 75·6 | ... | 55·0 | ·24 | 88·3 | ... | 55·0 | ... | 50·9 | ... | 45·2 | ... | 32·2 | ... |
| | III. *Conditions, &c.* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Debility ... ... | 19·8 | ... | 15·2 | ... | 15·6 | ... | 7·5 | ... | 18·8 | ... | 14·4 | ... | 14·2 | ... | 9·7 | ... | 10·5 | ... | 14·5 | ... | 21·4 | ·42 | 27·5 | ... | 9·1 | ·50 |
| | IV. *Poisons* ... | 3·9 | ... | 10·5 | ·39 | 4·7 | ... | 2·3 | ... | 7·2 | ... | 8·6 | 1·15 | 7·9 | ·66 | 6·1 | ·24 | 10·8 | ·64 | 4·6 | ·66 | 5·5 | ... | 1·5 | ... | 1·5 | 1·01 |
| | V. *Injuries.* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Accidental ... ... | 85·2 | ... | 75·7 | 1·17 | 90·5 | 1·11 | 72·5 | 2·88 | 50·3 | 1·21 | 95·6 | 2·88 | 117·7 | ·66 | 99·0 | 1·89 | 98·8 | ·64 | 90·7 | ·66 | 79·4 | ·42 | 58·4 | ... | 50·9 | ·50 |
| 3 | Homicidal ... ... | ... | ·36 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 4 | Self-Inflicted ... ... | ... | 1·08 | ... | ·78 | ... | ·28 | ... | ·58 | ·6 | ·61 | ... | ... | ·3 | ·33 | ... | ·24 | ·3 | 1·27 | ... | ·33 | ·8 | ·42 | ... | ... | ·5 | ·50 |
| | VI. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Surgical Operations ... | ·7 | ... | 1·2 | ... | ... | ... | 1·2 | ... | ·6 | ·61 | 1·2 | ... | ... | ... | ·2 | ... | ·3 | ... | 1·3 | ... | ... | ... | ... | ... | ... | ... |
| | No appreciable disease | ·3 | ... | 3·8 | ... | 1·7 | ... | 1·8 | ... | ... | ... | 1·2 | ... | 1·3 | ... | 3·1 | ... | 1·2 | ... | ·3 | ... | 3·4 | ... | 3·9 | ... | ·5 | ... |
| | Total ... ... | 1147·7 | 19·05 | 1510·1 | 24·18 | 1350·2 | 24·85 | 2242·2 | 29·34 | 957·5 | 12·12 | 2205·1 | 25·35 | 1665·6 | 21·70 | 1265·0 | 13·97 | 2073·8 | 26·69 | 1976·0 | 21·70 | 3857·5 | 31·11 | 2113·7 | 21·81 | 948·6 | 30·71 |

## General Diseases.

| Stations ... ... ... ... | Presidency. | | Allahabad. | | Oude. | | Saugor. | | Rohilcund. | | Gwalior. | | Meerut. | | Sirhind. | | Lahore. | | Peshawur. | | Jhelum. | | On the March. | | Depôts. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Diseases.** | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| *Febrile—* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Eruptive Fevers ... ... ... | 1 | 1 | 2 | .. | 4 | 1 | ... | ... | 1 | ... | ... | ... | 9 | 2 | 5 | ... | ... | ... | 4 | 1 | 1 | ... | 2 | ... | ... | ... |
| Continued ,, ... ... ... | 387 | 1 | 343 | 5 | 516 | 26 | 360 | 2 | 45 | ... | 197 | 2 | 363 | 4 | 383 | 1 | 816 | 13 | 1,594 | 15 | 807 | 7 | 90 | 3 | 106 | ... |
| Paroxysmal Fevers ... ... ... | 485 | 4 | 592 | 3 | 767 | 2 | 1,988 | 10 | 283 | ... | 1,853 | 1 | 1,733 | 7 | 1,746 | 5 | 2,701 | 6 | 5,333 | 10 | 2,851 | 11 | 634 | 6 | 814 | ... |
| Malignant Cholera ... ... ... | 9 | 8 | 5 | 4 | 11 | 6 | 1 | 1 | ... | ... | 1 | 1 | 1 | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | 1 | ... | ... |
| Influenza ... ... ... ... | 4 | ... | 8 | ... | 1 | ... | ... | ... | 7 | ... | ... | ... | 2 | ... | 1 | ... | 43 | ... | 7 | ... | 2 | ... | 2 | ... | 1 | ... |
| Erysipelas ... ... ... ... | 1 | ... | 1 | ... | 2 | ... | 5 | ... | 1 | ... | 3 | 1 | 7 | ... | 6 | ... | 10 | ... | 7 | ... | 3 | 1 | 2 | ... | 7 | ... |
| Other Diseases of this Group ... | 16 | ... | 5 | 2 | ... | ... | 1 | ... | ... | ... | 1 | ... | 3 | ... | 1 | ... | ... | 1 | 2 | ... | 1 | ... | ... | 2 | 1 | 1 |
| *Constitutional—* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rheumatism ... ... ... ... | 107 | ... | 162 | ... | 212 | ... | 91 | ... | 60 | ... | 100 | ... | 190 | ... | 301 | ... | 186 | ... | 152 | ... | 158 | ... | 73 | ... | 192 | ... |
| Syphilis ... ... ... ... | 297 | ... | 411 | ... | 489 | 1 | 213 | ... | 236 | ... | 230 | 1 | 315 | ... | 262 | 2 | 262 | 1 | 154 | ... | 194 | 1 | 181 | ... | 173 | 1 |
| Scrofula, Phthisis, &c. ... ... | 26 | 2 | 23 | 2 | 24 | 5 | 29 | 4 | 12 | ... | 16 | 3 | 47 | 7 | 48 | 5 | 32 | 2 | 23 | 4 | 30 | 7 | 14 | 7 | 49 | 2 |
| Scurvy and Purpura ... ... | 3 | ... | 4 | ... | 7 | ... | ... | ... | ... | ... | 2 | ... | 1 | ... | 1 | ... | 4 | ... | 1 | ... | 3 | ... | 1 | ... | 2 | ... |
| Anæmia ... ... ... ... | ... | ... | 19 | ... | 5 | ... | 21 | ... | 2 | ... | 12 | ... | 60 | ... | 61 | ... | 10 | ... | 15 | ... | 16 | ... | 11 | ... | 91 | ... |
| Other Diseases of this Group ... | 8 | 1 | 2 | 1 | 1 | 1 | ... | ... | 1 | ... | 2 | ... | 1 | ... | 5 | 1 | 4 | ... | 3 | ... | 4 | 1 | 1 | ... | 3 | ... |

Ratio per 1,000 of Mean Strength,

| Stations | Presidency. | | Allahabad. | | Oude. | | Saugor. | | Rohilcund. | | Gwalior. | | Meerut. | | Sirhind. | | Lahore. | | Peshawur | | Jhelum. | | On the March. | | Depôts. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| General Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| *Febrile*— | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Eruptive Fevers | ·4 | ·36 | ·8 | ... | 1·1 | ·28 | . | ... | ·6 | ... | ... | ... | 2·9 | ·60 | 1·2 | ... | ... | ... | 1·7 | ·42 | ·2 | ... | 1·0 | ... | ... | ... |
| Continued „ | 133·1 | ·36 | 133·8 | 1·95 | 142·4 | 7·26 | 207·1 | 1·15 | 27·3 | ... | 113·5 | 1·15 | 119·4 | 1·31 | 90·7 | ·21 | 259·3 | 4·13 | 670·0 | 6·31 | 265·1 | 2·30 | 45·3 | 1·51 | 82·5 | ... |
| Paroxysmal Fevers | 174·3 | 1·44 | 230·9 | 1·17 | 214·2 | ·55 | 1143·8 | 5·74 | 171·6 | ... | 1067·4 | ·58 | 569·9 | 2·30 | 413·6 | 1·18 | 858·3 | 1·90 | 2241·7 | 4·20 | 937·2 | 3·62 | 319·2 | 3·02 | 634·0 | ... |
| Malignant Cholera | 3·2 | 2·87 | 1·9 | 1·57 | 3·1 | 1·68 | ·6 | ·57 | ... | ... | ·6 | ·58 | ·3 | ... | ·2 | ... | ... | ... | ... | ... | ... | ... | ... | ·50 | ... | ... |
| Influenza | 1·4 | ... | 3·1 | ... | ·3 | ... | ... | ... | 4·3 | ... | ... | ... | ·7 | ... | ·2 | ... | 13·7 | ... | 2·9 | ... | ·6 | ... | 1·0 | ... | ·8 | ... |
| Erysipelas | ·4 | ... | ·4 | ... | ·5 | ... | 2·9 | ... | ·6 | ... | 1·6 | ·58 | 2·3 | ... | 1·4 | ... | 3·2 | ... | 2·9 | ... | 1·0 | ·33 | 1·0 | ... | 5·4 | .. |
| Other Diseases of this Group | 5·8 | ... | 1·9 | ·78 | ... | ... | ·6 | ... | ... | ... | ·6 | ... | 1·0 | ... | ·2 | ... | ... | ·32 | ·8 | ... | ·3 | ... | ... | 1·01 | ·8 | ·78 |
| *Constitutional*— | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rheumatism | 38·5 | ... | 63·2 | ... | 59·2 | ... | 52·4 | ... | 36·4 | ... | 57·6 | ... | 62·5 | ... | 71·3 | ... | 59·1 | ... | 63·9 | ... | 51·9 | ... | 36·8 | ... | 149·5 | ... |
| Syphilis | 106·7 | ... | 160·3 | ... | 136·6 | ·28 | 122·5 | ... | 143·1 | ... | 132·4 | ·58 | 103·6 | ... | 62·1 | ·47 | 83·2 | ·32 | 64·7 | ... | 63·8 | ·23 | 91·1 | ... | 134·7 | ·78 |
| Scrofula, Phthisis, &c. | 9·3 | ·72 | 9·0 | ·78 | 6·7 | 1·39 | 16·7 | 2·30 | 7·3 | ... | 9·2 | 1·72 | 15·5 | 2·30 | 11·4 | 1·18 | 10·2 | ·63 | 9·7 | 1·68 | 9·9 | 2·30 | 7·1 | 3·52 | 38·2 | 1·56 |
| Scurvy and Purpura | 1·1 | ... | 1·6 | ... | 2·0 | ... | ... | ... | ... | ... | 1·2 | ... | ·3 | ... | ·2 | ... | 1·3 | ... | ·4 | ... | 1·0 | ... | ·5 | ... | 1·6 | ... |
| Anæmia | ... | ... | 7·4 | ... | ·3 | ... | 12·1 | ... | 1·2 | ... | 6·9 | ... | 19·7 | ... | 14·4 | ... | 3·2 | ... | 6·2 | ... | 5·2 | ... | 5·5 | ... | 70·9 | ... |
| Other Diseases of this Group | 2·9 | ·36 | ·7 | ·39 | 1·3 | ·28 | ... | ... | ·6 | ... | 1·2 | ... | ·3 | ... | 1·2 | ·24 | 1·3 | ... | 1·3 | ... | 1·3 | ·33 | ·5 | ... | 2·3 | ... |

GENERAL DISEASES were greatly above the average in the Peshawur Saugor, Gwalior, Lahore, and Jhelum Divisions, the excess being entirely in the febrile group, and the mortality by them was very high in the Peshawur, Oude, Saugor, Lahore and Jhelum Divisions.

*Continued fevers* were much above the average in the Peshawur, Jhelum, Lahore, and Saugor, and the mortality by them was very high in the Oude, Peshawur, Lahore, and Jhelum Divisions. The great excess occurred from April till October. At Peshawur these fevers were very prevalent in May and June in the Royal Artillery, 1st Battalion 5th Regiment, and 38th Regiment, and in the latter corps they continued to prevail during the three succeeding months. In the Oude Division the excess was in the 1st Battalion 17th Regiment, at Lucknow, in which these fevers prevailed from May till September, and were very fatal, 13 deaths having occurred during that period, of which 9 were in May. In Lahore the 39th Regiment at Ferozepore furnished the largest proportion of cases, chiefly under the head of febricula, from May till October, and in the Jhelum Division the 36th at Rawul Pindee, had a large number of admissions from April till November.

*Paroxysmal fevers* were less prevalent than in 1869 in the Presidency, Allahabad, Rohilcund and Jhelum Divisions, but were more prevalent in all the others. The increase was extremely marked in the Peshawur District, where the ratio of admissions was nearly thrice as high as in the preceding year; it was also considerable in the Meerut and Lahore Divisions. The ratio of mortality was lower than in the preceding years in all the Divisions and Districts except the Lahore, Peshawur and Jhelum, and in these the increase was not considerable.

In the Peshawur District the great prevalence of paroxysmal fevers occurred during the last quarter of the year, when upwards of three-fifths of the whole of the cases were admitted. During the year the admissions by paroxysmal fevers at Peshawur amounted to 1898 per 1,000 of the strength in the Horse Artillery, 1705 in the Foot Artillery, and 2367 per 1,000 in the Infantry, and at Nowshera and Fort Attock in the Infantry to 1750 per 1,000. In the Lahore Division the 85th Regiment at Meean Meer, furnished a very high proportion, the admissions during the year having been double the strength. The 109th at Mooltan, also was much affected, the admissions having been nearly equal to the strength. The prevalence of paroxysmal fevers was also much above the average in the 1st Battalion 19th Regiment at Saugor, but this was to some extent due to its previous service at Peshawur, and in the 2nd Battalion 12th at Jubbulpore and Nowgong; in the 1st Battalion 11th at Morar, and the 2nd Battalion 1st Regiment at Jhansi and Seepree; in the wing of the 103rd at Roorkee, and in the Royal Artillery, the 1st Battalion 6th, and the 36th Regiment at Rawul Pindee, and the 58th at Sealkote.

*Malignant cholera* can scarcely be said to have prevailed as an epidemic among the European troops in any of the Divisions. The disease, however, showed itself in the end of April or beginning of May in the 26th Regiment at Fyzabad, when 11 cases were admitted, of which 7 proved fatal. In July in the 107th Regiment at Hazareebaugh it caused 7 admissions and 6 deaths; it was epidemic at the time among the civil population, and was attended with a considerable amount of diarrhœa in the corps. In October 3 fatal cases occurred in the 3rd Battalion Rifle Brigade at Dinapore. With these exceptions there was no prevalence of the disease among the troops.

*Syphilis* was less prevalent than in 1869 in the Presidency, Allahabad, Gwalior, and Sirhind Divisions, and more prevalent in all the others; the highest ratio of admissions was in the Allahabad, and the lowest in the Sirhind Division, but the ratio in the latter was scarcely exceeded by that in the Peshawur District and Jhelum Division. In all the Divisions, except Sirhind, Peshawur, Jhelum, and Lahore, the prevalence of this disease is very great, and the results of the system of Lock Hospitals have not as yet been encouraging. There is great room for the operation of preventive measures.

*Scrofula, Phthisis, &c.*, have been less prevalent and fatal in most of the Divisions than in 1869; the decrease being most marked in the Sirhind, Rohilcund, and Oude Divisions. In some of the Divisions there has been

*Bengal.* a slight increase in the mortality, but in none has there been such an excess over the average as to call for remark.

*Anæmia.*—The admissions from this cause were high in the Meerut, Sirhind, and Saugor Divisions; the excess in the first occurred chiefly in the 105th Regiment at Meerut; in the Sirhind Division it was caused by a large number of cases in the 92nd Regiment at Jullundur, and in the Saugor Division all the cases occurred in the 1st Battalion 19th Regiment.

Local Diseases.—*Diseases of the Nervous System* were much less prevalent and fatal than in 1869 in all the Divisions, except the Rohilcund and Gwalior, in which there was an increase in the admissions, and the Peshawur District, which showed an increase in both admissions and deaths. The ratio of admissions was lowest in Rohilcund, and none of the cases terminated fatally; it was highest in the Gwalior District, and much above the average in the Lahore Division, in which also the highest ratio of deaths occurred. The excess in the Gwalior District was chiefly in the 1st Regiment, at Jhansi, from the prevalence of epilepsy and neuralgia, the latter of malarious origin. The high ratio of deaths in the Lahore Division was caused by the occurrence of 8 deaths from heat apoplexy in the 39th Regiment, at Ferozepore, the result of exposure and drinking combined; 5 of the deaths occurred out of hospital.

*Diseases of the Eyes* were more prevalent than in 1869 in all the Divisions, except the Saugor, Sirhind, and Lahore. They were most prevalent in the Oude Division, where the greatest number of admissions occurred in the 1st Battalion 17th Regiment, at Lucknow; but even in it ophthalmia cannot be said to have prevailed as an epidemic.

*Diseases of the Circulatory System* were much more prevalent than in 1869 in all the Divisions and Districts except the Presidency, Lahore, and Jhelum. In the Peshawur District the increase was owing to a large number of cases of palpitation in the 1st Battalion 5th and the 38th Regiments at Peshawur, and in the 104th at Nowshera, a result probably of the debility consequent upon repeated attacks of fever.

*Diseases of the Respiratory System* did not differ materially from the results in 1869, except in the Peshawur District, where the admissions reached the very high ratio of 169 per 1,000 of the strength, being nearly thrice as high as in the preceding year. The excess occurred chiefly from bronchitis in the 38th Regiment, and also, though to a less extent, in the 1st Battalion 5th Regiment, both at Peshawur, and was attributed by the medical officers to the great variations of temperature between the night and day and the insufficiency of clothing at night.

*Diseases of the Digestive System* gave rise to a lower proportion than in 1869, both of admissions and deaths in all the Divisions and Districts except the Presidency, where there was a slight increase in the admissions, and Lahore and Rohilcund, in the former of which there was a mere fractional increase of admissions, and in the latter of deaths. The lowest ratio, both of admissions and deaths, was in the Sirhind, and the highest in the Allahabad Divisions. In the latter, the excess was chiefly due to the prevalence of hepatic affections in the 1st Battalion 14th Regiment at Cawnpore, of dysentery and hepatic affections in the 3rd Battalion Rifle Brigade at Dinapore; and of diarrhœa in the Royal Artillery at the same station. The following Table shows the relative prevalence, in each of the Divisions and Districts, of dysentery, diarrhœa, and hepatitis:—

| Divisions or Districts. | Ratio per 1,000 of Mean Strength. | | Divisions or Districts. | Ratio per 1,000 of Mean Strength. | |
|---|---|---|---|---|---|
| | Admitted. | Died. | | Admitted. | Died. |
| Presidency .. | 161·0 | 5·75 | Meerut .. .. | 174·3 | 7·23 |
| Allahadad .. .. | 228·2 | 10·53 | Sirhind .. .. | 103·0 | 2·60 |
| Oude .. .. .. | 170·1 | 6·98 | Lahore .. .. | 156·7 | 4·45 |
| Saugor .. .. | 165·7 | 9·20 | Peshawur .. | 133·1 | 3·62 |
| Rohilcund .. .. | 143·1 | 5·46 | Jhelum .. .. | 166·0 | 6·00 |
| Gwalior .. .. | 149·2 | 7·49 | | | |

The Table shows how very important a position these diseases occupy as causes of mortality among the troops throughout India; the ratio of deaths by them having been above 5 per 1,000 in all the Divisions and Districts, except Sirhind, Peshawur, and Lahore. The very frequent co-existence of dysentery and hepatic abscesses in the fatal cases renders it more advisable in any inquiry like the present to associate these diseases together, than to attempt any minute investigation into the apparent relative prevalence of them separately in the different Districts.

*Diseases of the Urinary System* were more prevalent than in 1869 in the Allahabad, Meerut, and Oude Divisions, but less prevalent in all the others, except Lahore and Jhelum, where the rates of the two years were nearly identical. The difference in the admissions was due almost entirely to the relative prevalence of gonorrhœa.

Poisons.—With a very few exceptions, the cases returned in this class were of delirium tremens, including 7 and a death from alcoholic poisoning. Of the other cases admitted, 1 was from poisoning by Indian hemp, 1 by opium, 2 were by castor-oil seeds, 3 by snake-bites, and 1 was a poisoned wound received by a farrier-serjeant in dissecting a horse.

The following Table shows the admissions and deaths in each Corps serving in the Bengal Command during the year 1870:—

| Regiments. | Average Strength for the Year. | Admitted into Hospital. | Deaths. | | | Ratio per 1,000. | | Stations during the Year. | |
|---|---|---|---|---|---|---|---|---|---|
| | | | In India. | Of Invalids. | Total. | Admitted. | Died. | | |
| CAVALRY. | | | | | | | | | months. |
| 4th Hussars .. | 448 | 578 | 10 | 1 | 11 | 1290·2 | 24·55 | Meerut | 12 |
| 5th Lancers .. | 462 | 448 | 12 | 1 | 13 | 969·6 | 28·14 | On the march | 1 2/3 |
| | | | | | | | | Scalkote | 10 1/3 |
| | | | | | | | | Scalkote | 3/3 |
| 7th Hussars .. | 65 | 57 | .. | .. | .. | 876·9 | .. | On the march | 1 |
| | | | | | | | | Embarked for England. | |
| 11th „ .. | 398 | 451 | 2 | .. | 2 | 1133·2 | 5·03 | Muttra | 12 |
| | | | | | | | | Benares and Cawnpore | 3/3 |
| 19th „ .. | 43 | 33 | 4 | .. | 4 | 767·4 | 93·02 | On the march | 3/3 |
| | | | | | | | | Embarked for England. | |
| 20th „ .. | 428 | 574 | 7 | 1 | 8 | 1341·1 | 18·69 | On the march | 2 |
| 21st „ .. | 440 | 813 | 6 | 1 | 7 | 1861·4 | 15·91 | Umballa | 10 |
| | | | | | | | | Lucknow | 12 |
| Total Cavalry .. | 2,284 | 2,960 | 41 | 4 | 45 | 1296·0 | 19·70 | | |

*Bengal.*

| Regiments. | Average Strength for the Year. | Admitted into Hospital. | Deaths. In India. | Deaths. Of Invalids. | Deaths. Total. | Ratio per 1,000. Admitted. | Ratio per 1,000. Died. | Stations during the Year. Batt.: | months. |
|---|---|---|---|---|---|---|---|---|---|
| ROYAL ARTILLERY. | | | | | | | | | |
| A Brigade R.H.A. | 675 | 1,981 | 20 | 3 | 23 | 2934·8 | 34·07 | A, On the march | $\frac{1}{28}$ |
| | | | | | | | | ,, Peshawur | $11\frac{27}{28}$ |
| | | | | | | | | B, Peshawur | $1\frac{1}{28}$ |
| | | | | | | | | ,, On the march | $\frac{1}{28}$ |
| | | | | | | | | ,, Rawul Pindee | $10\frac{1}{28}$ |
| | | | | | | | | C, On the march | $\frac{1}{28}$ |
| | | | | | | | | ,, Meerut | $11\frac{1}{28}$ |
| | | | | | | | | D, On the march | $1\frac{1}{28}$ |
| | | | | | | | | ,, Peshawur | $10\frac{27}{28}$ |
| | | | | | | | | E, Peshawur | $\frac{1}{28}$ |
| | | | | | | | | ,, On the march | $\frac{1}{28}$ |
| | | | | | | | | ,, Sealkote | 11 |
| F Batt. C Brigade R.H.A. .. | 139 | 188 | 4 | .. | 4 | 1352·5 | 28·78 | On the march | 1 |
| | | | | | | | | Umballa | 11 |
| F Brigade R.H.A. | 832 | 1,554 | 14 | .. | 14 | 1867·8 | 16·83 | A, Benares | 12 |
| | | | | | | | | B, Morar | 12 |
| | | | | | | | | C, Lucknow | 12 |
| | | | | | | | | D, Rawul Pindee | $\frac{1}{28}$ |
| | | | | | | | | ,, On the march | $2\frac{27}{28}$ |
| | | | | | | | | ,, Meerut | 9 |
| | | | | | | | | E, Umballa | 12 |
| | | | | | | | | F, Meean Meer | 12 |
| 8th Brigade R.A. | 1,012 | 1,639 | 24 | 3 | 27 | 1619·6 | 26·68 | B, Dinapore | 12 |
| | | | | | | | | C, On the march | 1 |
| | | | | | | | | ,, Lucknow | 11 |
| | | | | | | | | D, Bareilly | 12 |
| | | | | | | | | E, Fyzabad | 10 |
| | | | | | | | | ,, On the march | $1\frac{27}{28}$ |
| | | | | | | | | ,, Saugor | $\frac{1}{28}$ |
| | | | | | | | | F, Seetapore | 11 |
| | | | | | | | | ,, On the march | 1 |
| | | | | | | | | G, Cawnpore | 10 |
| | | | | | | | | ,, On the march | $1\frac{2}{28}$ |
| | | | | | | | | ,, Jullundur | $\frac{1}{28}$ |
| | | | | | | | | H, On the march | $\frac{1}{28}$ |
| | | | | | | | | ,, Meean Meer | $11\frac{1}{28}$ |
| 16th ,, ,, | 998 | 1,492 | 32 | 2 | 34 | 1495·0 | 34·68 | A, Dum-Dum | $\frac{2}{28}$ |
| | | | | | | | | ,, Barrackpore | 10 |
| | | | | | | | | ,, On the march | $1\frac{1}{28}$ |
| | | | | | | | | B, On the march | 1 |
| | | | | | | | | ,, Barrackpore | 11 |
| | | | | | | | | C, On the march | $2\frac{2}{28}$ |
| | | | | | | | | ,, Morar | $9\frac{1}{28}$ |
| | | | | | | | | D, Allahabad | 12 |
| | | | | | | | | E, Saugor | 12 |
| | | | | | | | | F, On the march | $1\frac{2}{28}$ |
| | | | | | | | | ,, Meerut | $10\frac{1}{28}$ |
| | | | | | | | | G, Jubbulpore | 10 |
| | | | | | | | | ,, On the march | $\frac{2}{28}$ |
| | | | | | | | | ,, Bareilly | $\frac{1}{28}$ |

| Regiments. | Average Strength for the Year. | Admitted into Hospital. | Deaths. | | | Ratio per 1,000. | | Stations. during the Year. |
|---|---|---|---|---|---|---|---|---|
| | | | In India. | Of India. | Total. | Admitted. | Died. | |
| RL. ARTILLERY—*continued.* | | | | | | | | Batt.: months. |
| | | | | | | | | A, Jhansi 11 2/3 |
| | | | | | | | | ,, On the march 2/3 |
| | | | | | | | | B, Peshawur 4 |
| | | | | | | | | ,, Campbellpore 7 1/3 |
| | | | | | | | | ,, On the march 2/3 |
| | | | | | | | | C, Mooltan 12 |
| 19th Brigade R.A. | 1,007 | 2,177 | 20 | 5 | 25 | 2161·9 | 24·83 | D, Mooltan 1/3 |
| | | | | | | | | ,, On the march 2 1/3 |
| | | | | | | | | ,, Meerut 9 1/3 |
| | | | | | | | | E, Rawul Pindee 12 |
| | | | | | | | | F, Agra 12 |
| | | | | | | | | G, Jullundur 10 |
| | | | | | | | | ,, On the march 2 |
| | | | | | | | | A, Umballa 2 2/3 |
| | | | | | | | | ,, On the march 1/3 |
| | | | | | | | | ,, Jutogh 9 |
| | | | | | | | | B, Ferozepore 10 |
| | | | | | | | | ,, On the march 1 2/3 |
| | | | | | | | | ,, Peshawur 2/3 |
| 22nd ,, ,, | 573 | 984 | 9 | 2 | 11 | 1717·4 | 19·20 | 3, Calcutta 12 |
| | | | | | | | | 4, Umritsur 11 |
| | | | | | | | | ,, Meean Meer 1 |
| | | | | | | | | 5, Meean Meer 1/3 |
| | | | | | | | | ,, Ferozepore 11 2/3 |
| | | | | | | | | 6, Saugor 12 |
| | | | | | | | | 7, Agra 12 |
| | | | | | | | | 1, Delhi 12 |
| | | | | | | | | 2, Fort Gwalior 12 |
| | | | | | | | | 3, Lucknow 12 |
| 24th ,, ,, | 416 | 637 | 7 | .. | 7 | 1531·3 | 16·83 | 4, Darjeeling 12 |
| | | | | | | | | 5, Meean Meer & Fort Lahore 12 |
| | | | | | | | | 6, Fort Attock 12 |
| | | | | | | | | 1, On march 2/3 |
| | | | | | | | | ,, Allahabad 11 1/3 |
| | | | | | | | | 2, Mooltan 12 |
| 25th ,, ,, | 385 | 699 | 9 | 4 | 13 | 1815·6 | 33·77 | 3, Morar 12 |
| | | | | | | | | 4, Peshawur 12 |
| | | | | | | | | 5, Rawul Pindee 5 |
| | | | | | | | | ,, Khyra Gully 7 |
| Total Artillery. | 6,037 | 11,351 | 139 | 19 | 158 | 1880·2 | 26·17 | |
| INFANTRY. | | | | | | | | |
| | | | | | | | | From Bombay. |
| 2nd Bn. 1st Foot | 672 | 1,696 | 14 | .. | 14 | 2523·8 | 20·83 | On the march 1 |
| | | | | | | | | Jhansi 9 1/3 |
| | | | | | | | | On the march 1 |
| | | | | | | | | Dugshai 9 2/3 |
| 1st ,, 3rd ,, | 879 | 497 | 5 | .. | 5 | 565·4 | 5·69 | On the march |
| | | | | | | | | Seetapore 1 2/3 |
| | | | | | | | | Benares (Wing) 2 |

*Bengal.*

| Regiments. | Average Strength for the Year. | Admitted into Hospital. | Deaths. | | | Ratio per 1,000. | | Stations during the Year. | |
|---|---|---|---|---|---|---|---|---|---|
| | | | In India. | Of Invalids. | Total. | Admitted. | Died. | | months. |
| INFANTRY—*cont.* | | | | | | | | | |
| 1st Bn. 5th Foot | 896 | 3,507 | 36 | .. | 36 | 3914·1 | 40·18 | On the march | 2/30 |
| | | | | | | | | Peshawur | 10 26/30 |
| | | | | | | | | Nowshera | 1/30 |
| 1st „ 6th „ | 847 | 1,433 | 18 | 2 | 20 | 1691·8 | 23·61 | Rawul Pindee | 12 |
| 1st „ 7th „ | 20 | 30 | 4 | .. | 4 | 1500 0 | 200·00 | Saugor | 2/30 |
| | | | | | | | | On the march | 28/30 |
| 1st „ 11th „ | 852 | 1,521 | 21 | 1 | 22 | 1785·2 | 25·82 | Morar | 12 |
| 2nd „ 12th „ | 803 | 1,940 | 29 | 2 | 31 | 2415·9 | 38·61 | Jubbulpore | 12 |
| 1st „ 14th „ | 830 | 1,482 | 13 | 1 | 14 | 1785·5 | 16·87 | Cawnpore | 12 |
| 1st „ 17th „ | 682 | 992 | 28 | .. | 28 | 1454·5 | 41·06 | From England. | |
| | | | | | | | | On the march. | 1½ |
| | | | | | | | | Lucknow | 9 |
| 1st „ 19th „ | 822 | 1,731 | 13 | .. | 13 | 2105·8 | 15·82 | On the march | 2/30 |
| | | | | | | | | Saugor | 11 28/30 |
| 2nd „ 19th „ | 872 | 1,138 | 10 | 2 | 12 | 1305·0 | 13·76 | Calcutta | 12 |
| 2nd „ 25th „ | 882 | 719 | 13 | .. | 13 | 815·2 | 14·74 | Bareilly | 12 |
| 26th Foot .. | 823 | 958 | 25 | 1 | 26 | 1164·0 | 31·59 | On the march | 2/30 |
| | | | | | | | | Fyzabad | 11 28/30 |
| 36th „ .. | 712 | 1,627 | 17 | .. | 17 | 2285·1 | 23·88 | Rawul Pindee | 12 |
| 37th „ .. | 750 | 847 | 11 | .. | 11 | 1129·3 | 14·67 | Shajehanpore | 10 1/30 |
| | | | | | | | | On the march | 1 |
| | | | | | | | | Meean Meer | 2/30 |
| | | | | | | | | Wing, Moradabad | 10 27/30 |
| 38th „ .. | 821 | 3,039 | 27 | 2 | 29 | 3701·6 | 35·32 | Peshawur | 12 |
| 39th „ .. | 831 | 1,123 | 26 | .. | 26 | 1351·4 | 31·29 | Ferozepore | 12 |
| 41st „ .. | 863 | 654 | 10 | 3 | 13 | 757·8 | 15·06 | Subathoo | 10 1/30 |
| | | | | | | | | On the march | 1/30 |
| | | | | | | | | Mooltan | 1 1/30 |
| 55th „ .. | 883 | 811 | 16 | 1 | 17 | 918·5 | 19·25 | Chuckratta | 12 |
| 58th „ .. | 621 | 1,191 | 13 | 2 | 15 | 1918·9 | 24·15 | Allahabad | 1/30 |
| | | | | | | | | On the march | 1 |
| | | | | | | | | Sealkote | 10 2/30 |
| 2nd Bn. 60th Rifles | 777 | 984 | 6 | .. | 6 | 1266·4 | 7·72 | Seetapore | 10 1/30 |
| | | | | | | | | On the march | 1 2/30 |
| | | | | | | | | Wing, Benares | 10 |
| | | | | | | | | On the march | 1 2/30 |
| | | | | | | | | Peshawur | 1/30 |
| 62nd Foot .. | 820 | 776 | 19 | 1 | 20 | 946·3 | 24·39 | Lucknow | 12 |
| 63rd „ .. | 131 | 126 | 2 | .. | 2 | 963·7 | 15·27 | Arrived from England. | |
| | | | | | | | | On the march | 1 |
| | | | | | | | | Hazareebaugh | 2/30 |
| 77th „ .. | 123 | 102 | 1 | 2 | 3 | 829·3 | 24·39 | Agra | 1 2/30 |
| | | | | | | | | On the march | 1 |
| | | | | | | | | Embarked for England. | |
| 85th „ .. | 871 | 2,595 | 23 | 2 | 25 | 2979·3 | 28·70 | Meean Meer | 11 1/30 |
| | | | | | | | | On the march | 1/30 |
| | | | | | | | | Dugshai | 1/30 |
| 88th „ .. | 572 | 896 | 10 | 1 | 11 | 1566·5 | 19·23 | Nowshera | 1 |
| | | | | | | | | On the march | 1 1/30 |
| | | | | | | | | Agra | 7 2/30 |
| | | | | | | | | On the march | 1/30 |
| 92nd „ .. | 845 | 1,844 | 12 | 2 | 14 | 2182·2 | 16·58 | Jullundur | 12 |

| Regiments. | Average Strength for the Year. | Admitted into Hospital. | Deaths. In India. | Deaths. Of Invalids. | Deaths. Total. | Ratio per 1,000. Admitted. | Ratio per 1,000. Died. | Stations during the Year. | months. |
|---|---|---|---|---|---|---|---|---|---|
| INFANTRY—*cont.* | | | | | | | | | |
| 93rd Foot .. | 64 | 61 | 1 | .. | 1 | 953·1 | 15·63 | On the march | 1 1/3 |
| | | | | | | | | Embarked for England. | |
| 96th „ .. | 872 | 961 | 17 | 3 | 20 | 1102·1 | 22·94 | Dum-Dum | 10 2/3 |
| | | | | | | | | Dinapore | 1 1/3 |
| 102nd „ .. | 77 | 30 | 2 | .. | 2 | 389·6 | 25·97 | Lucknow | 1 |
| | | | | | | | | On the march | 2/3 |
| | | | | | | | | Embarked for England. | |
| 103rd „ .. | 553 | 862 | 14 | .. | 14 | 1558·8 | 25·32 | Roorkee | 11 1/3 |
| | | | | | | | | On the march | 2/3 |
| | | | | | | | | Wing, Delhi | 11 2/3 |
| | | | | | | | | On the march | 1/3 |
| 104th „ .. | 697 | 1,625 | 18 | 1 | 19 | 2331·4 | 27·26 | Peshawur | 2/3 |
| | | | | | | | | Nowshera | 11 1/3 |
| 105th „ .. | 723 | 1,013 | 17 | 1 | 18 | 1401·1 | 24·90 | Meerut | 12 |
| 106th „ .. | 878 | 1,375 | 14 | 1 | 15 | 1566·1 | 17·08 | Umballa | 10 |
| | | | | | | | | On the march | 2/3 |
| | | | | | | | | Jhansi | 1 1/3 |
| 107th „ .. | 887 | 372 | 18 | .. | 18 | 983·0 | 20·29 | Hazareebaugh | 10 |
| | | | | | | | | On the march | 2/3 |
| | | | | | | | | Dum-Dum | 1 1/3 |
| 109th „ .. | 819 | 1,553 | 23 | 1 | 24 | 1896·2 | 29·30 | Mooltan | 10 2/3 |
| | | | | | | | | On the march | 1 |
| | | | | | | | | Roorkee | 1/3 |
| 3rd Bn. Rifle Brig. | 705 | 864 | 30 | 3 | 33 | 1225·5 | 46·81 | Dinapore | 10 1/3 |
| | | | | | | | | For Bombay. | |
| Total Infantry . | 25,775 | 43,475 | 576 | 35 | 611 | 1686·7 | 23·70 | | |

The admissions and deaths were highest in the Artillery and lowest in the Cavalry, the Infantry holding an intermediate position. In the Cavalry, omitting the 7th and 19th Hussars, which were in the country for a short time only, the highest ratio of admissions was in the 21st Hussars at Lucknow, and of deaths in the 5th Lancers at Sealkote, while the latter Corps had the lowest ratio of admissions, and the 11th Hussars, at Muttra, of deaths.

In the Artillery, omitting the C Brigade Royal Horse Artillery, of which there was only one Battery in the Command, the highest ratio of admissions occurred in the A Brigade Royal Horse Artillery, and the lowest in the 16th Brigade Royal Artillery; the lowest ratio of deaths occurred in the F Brigade Royal Horse Artillery and the 24th Brigade Royal Artillery, in which the results were identical, and the highest in the 16th Brigade, but it very slighty exceeded the ratio in the A Brigade Royal Horse Artillery, or that in the 25th Brigade Royal Artillery.

In the Infantry, omitting those Corps which were only a short time in the Command, the highest ratio of admissions occurred in the 1st Battalion 5th Regiment at Peshawur, and next to it in the 38th Regiment, at the same station, while the lowest was in the 1st Battalion 3rd Regiment at Dugshai, and it was also very low in the 41st at Subathoo. The highest ratio of deaths occurred in the 3rd Battalion Rifle Brigade at Dinapore, and the ratio was also extremely high in the 1st Battalion 17th Regiment,

*Bengal.* which arrived at Lucknow from England in February; in the 1st Battalion 5th Regiment at Peshawur; and in the 2nd Battalion 12th Regiment at Jubbulpore. The lowest ratio occurred in the 1st Battalion 3rd Regiment at Dugshai, and it was also under one per cent. in the 2nd Battalion 60th Rifles—one wing at Seetapore and the other at Benares.

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SANITARY REPORT.

Inspector-General Muir, C.B., Principal Medical Officer of Her Majesty's British Forces, makes the following remarks in his Sanitary Report for 1870:—

The year may be considered to have been (for India) a comparatively healthy one. Cholera did not prevail to any considerable extent. Malarious fever, however, was very rife in the autumn at several stations (the Punjaub especially), although fortunately without very serious fatal effects. The causes of disease may be considered to have been purely climatic, and not due to insanitary conditions. Such sanitary defects as existed were speedily remedied when brought to the notice of the local authorities, or when referred by them to Army Head-Quarters. The only exception to this rule occurred in the case of the Government refusing to sanction the issue of an extra blanket to the troops in Peshawur. The Deputy Inspector-General of the Circle urged the necessity of this measure, which, after careful enquiry I endorsed, and strongly recommended, from a conviction that the repeated attacks of fever, to which the men were in the great majority of instances subject, arose from the sudden reduction of temperature after sundown, against which their regulated allowance of bedding (the same as in the plains of Bengal) did not furnish adequate protection.

The sanitary improvements proposed and carried out during the year, are so fully detailed in the reports of the respective Medical Officers in charge, that it only remains for me to make a few general remarks under this and other heads embraced in the Return.

*Accommodation.*—The financial difficulties of the Government have checked, or put a temporary stop to the extension of barrack accommodation on the scale that has been adopted for several years past. Nevertheless, it has not been altogether suspended. At Ranee Khêt, Chukratta, Dalhousie, Nowgong, Saugor, and other localities, barracks, of various characters, have been proceeded with or completed. It is gratifying to remark that this observation applies in a special manner to Hill Stations, as to the expediency of extending which the Government are fully alive. Last year 6,981 men and families were located in the hills during the hot season, either in the form of working parties, convalescents at Sanitaria, or regiments at stations. This number will be this year increased by 1,200 or 1,300, irrespective of 800 at Cherat, and 200 at the new Hill Depôt in Central India, Puchmarree, making a grand total of 7,997, or in round numbers 8,000.

This result has been, to a considerable extent, brought about by the Government sanctioning the exchange of men between Kussowlie and Umballa; by utilizing the lower storeys of the former sanitarium as dormitories, and by turning to account the vacant barracks at Dugshai. It may be confidently predicted that against the season of 1873–4, one-quarter of the Army will be located during the hot season at Hill Stations in suitable barracks or huts.

*Water supply.*—An opinion seems to have got abroad, especially in England, that the European troops in India are very indifferently provided with water of a pure and wholesome quality, and that much of the disease to which they are subject is directly traceable to this source. I believe this idea to be an exaggerated one. With few exceptions the supply is adequate and wholesome.

In the case of Peshawur I am glad to say the Government has sanctioned a grant of money for the purpose of drawing the water off at the

head stream of the Bara, and conveying it to the station in iron or other pipes. *Bengal.*

In the case of Meean Meer and Delhi the supply is now procured from the adjoining canal or river; at Agra Fort it is brought for drinking purposes from outside, and there is every probability that Fort William will very shortly be provided from hydrants with the excellent Calcutta water, the tank supply (more or less objectionable) being dispensed with. At several selected stations Macnamara's filters have been used experimentally, but with what results I am not yet acquainted, and the Government has recently sanctioned the employment of Dr. Normandy's steam purifying apparatus at Allahabad; a process (if generally introduced) I conceive unnecessary and out of place in Indian Cantonments.

While then much has been done of late to increase the purity of the water supply, it must be confessed that a good deal still remains to be done; such as the covering in of wells, the provision of pumps, the substitution of suitable vessels for the objectionable mussacks, and improvements in the mode of distribution; to all of which the attention of the Government has been repeatedly called.

The exaggeration to which I have alluded, has been due in a great measure to the water question being mixed up with theories of cholera and other epidemic diseases. While freely admitting that a pure water supply is one of the first conditions of health and must be worked up to at any cost, it is due to the authorities to state that great exertion has been made to secure this boon to the British soldier serving in India, and with a success (a few isolated localities excepted) that cannot be gainsaid.

*Diet.*—There is still at many stations a deficiency of fresh potatoes during the summer months, when the dietary is supplemented by whall, mixed vegetables, &c, but in proportion as railway communication is extended and the hills, so fruitful in this esculent, are brought into more direct communication with the plains, it is to be expected that this deficiency will gradually disappear.

*Clothing.*—The late issue of the serge jacket or loose coat to the men of the Royal Artillery has proved a great success.

*Dry Earth System.*—The same remark applies to the dry earth system of conservancy which has now been some years in use, and is almost universal in this Presidency.

*Drainage.*—The authorities do not yet seem sufficiently alive to the advantages of surface and subsoil drainage in many of the stations in the plains, of which Cawnpore may be given as an illustration.

*Recruits.*—The extreme youth of the recruits sent to this country during the year, has again obliged me to call the attention of the Authorities to this subject. Of the 2,424 who have joined in 1870–71 no fewer than 1,118 were found to be under 20 years of age, and 1,081 not yet dismissed drill. In my representation to His Excellency the Commander-in-Chief, I took occasion to recommend that all these lads should be sent to the hills (tents in my opinion, even in the rainy season, being preferable to exposure in the plains in a first year of residence) but, though strongly backed by His Excellency the Commander in-Chief, my recommendation was not acted upon by the Government of India.

*Peshawur.*—I have felt it my duty again to bring this unhealthy station under the notice of Government, with a view (if practicable) of having the European garrison there further reduced. The Commander-in-Chief had one Battery of Royal Artillery withdrawn during the unhealthy season to Campbellpoor. Cherat, as formerly stated, has also been largely utilized with the same object in view, but it is still much to be regretted that military necessity should demand such a sacrifice of health and life, as service in that deadly valley, year after year, almost certainly entails.

*Venereal.*—Although the Contagious Diseases Act in force in this country has been lately extended in its provisions, it is to be regretted that at certain stations (Cawnpore for example) its operation has not been so successful as could be desired, although in others it has worked much good. The difficulty attending the examination of the registered women, the proximity of large

*Bengal.* native cities to cantonments, or (as at Jhansie) to foreign territory, and other causes render the Act less operative than was anticipated. The subject however is under consideration of the Authorities with a view to more perfect repression of this class of disease.

In regard to the Depôt Stations Dr. Muir makes the following remarks :—

During the year the Chinsura Depôt has been abolished, such of the Staff as were retained being transferred to Fort William.

*Dalhousie.*—The sanitarium is still unfinished. Ablution and bath rooms have been erected. The cooking accommodation is still insufficient; and the water supply, instead of being conveyed in pipes, is still provided by bheesties.

*Kussowlie.*—Has been largely utilized by the Government having sanctioned the exchange of men between the sanitarium and Umballa, and the conversion of the ground floor into dormitories for young soldiers who would inevitably suffer by residence in the plains.

*Nynee Tal.*—Washing accommodation still defective.

*Darjeeling.*—Ventilation and means of ablution defective. A drying-room very desirable.

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## II.—Madras.

### STATISTICAL REPORT.

*Madras.* The average strength of the European troops in this Command, exclusive of the 1st Battalion 21st Regiment, was 9,936; the admissions into hospital amounted to 12,728 and the deaths to 235, inclusive of 26 among the invalids on their passage home and at Netley. These numbers give the annual ratio of 1,281 admissions and 23·65 deaths per 1,000 of mean strength, both lower than in the preceding year.

The following Table, framed from Abstract No. 20 in the Appendix, shows the influence of the different classes of diseases on the sickness and mortality :—

| Orders. | Diseases. | Strength, 9,936. | | | | Ratio per 1,000 of Mean Strength. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1870. | | 1869. | |
| | | Admitted. | Deaths. | | | Admitted. | Died. | Admitted. | Died. |
| | | | In the Command. | Of Invalids. | Total. | | | | |
| | I. *General Diseases.* | | | | | | | | |
| 1 | Febrile Group .. | 2,400 | 52 | 1 | 53 | 241·6 | 5·33 | 223·6 | 5·35 |
| 2 | Constitutional „ .. | 1,637 | 16 | 3 | 19 | 164·8 | 1·91 | 189·9 | 2·24 |
| | II. *Local Diseases.* | | | | | | | | |
| | Diseases of the— | | | | | | | | |
| 1 | Nervous System .. | 201 | 24 | .. | 24 | 20·2 | 2·42 | 25·7 | 3·60 |
| 2 | Eye .. .. .. | 254 | .. | .. | .. | 25·6 | .. | 25·3 | .. |
| 3 | Ear .. .. .. | 74 | .. | .. | .. | 7·4 | .. | 6·1 | .. |
| 4 | Nose .. .. .. | 5 | .. | .. | .. | ·5 | .. | ·2 | .. |
| 5 | Circulatory System .. | 132 | 19 | 2 | 21 | 13·3 | 2·11 | 12·1 | 1·95 |
| 6 | Absorbent „ .. | 286 | .. | .. | .. | 28·8 | .. | 17·2 | .. |
| 8 | Respiratory „ .. | 447 | 6 | 2 | 8 | 45·0 | ·81 | 43·3 | ·58 |
| 9 | Digestive „ .. | 3,386 | 67 | 18 | 85 | 340·8 | 8·56 | 360·5 | 9·24 |
| 10 | Urinary „ .. | 745 | 1 | .. | 1 | 75·0 | ·10 | 104·6 | ·10 |
| 11 | Generative „ .. | 161 | .. | .. | .. | 16·2 | .. | 18·0 | .. |
| 12 | Organs of Locomotion | 59 | .. | .. | .. | 5·9 | .. | 5·5 | .. |
| 13 | Cellular Tissue .. | 173 | .. | .. | .. | 17·4 | .. | 15·7 | .. |
| 14 | Cutaneous System .. | 976 | .. | .. | .. | 98·2 | .. | 100·1 | .. |
| | III. *Conditions, &c.* | | | | | | | | |
| | Debility .. | 524 | .. | .. | .. | 52·7 | .. | 32·0 | ·39 |
| | IV. *Poisons* .. | 100 | 4 | .. | 4 | 10·0 | ·40 | 26·9 | 1·17 |
| | V. *Injuries.* | | | | | | | | |
| 2 | Accidental .. .. | 1,155 | 15 | .. | 15 | 116·3 | 1·51 | 120·4 | ·97 |
| 3 | Homicidal .. .. | .. | .. | .. | .. | .. | .. | .. | ·20 |
| 4 | Self-inflicted .. .. | 2 | 5 | .. | 5 | ·2 | ·50 | ·2 | ·58 |
| | VI. *Surgical Operations* | 2 | .. | .. | .. | ·2 | .. | .. | .. |
| | No appreciable disease | 9 | .. | .. | .. | ·9 | .. | 1·3 | .. |
| | Total .. .. | 12,728 | 209 | 26 | 235 | 1281·0 | 23·65 | 1328·6 | 26·37 |
| | Average of 10 years, 1860-69 | .. | .. | .. | .. | 1389·5 | 22·53 | .. | .. |

GENERAL DISEASES were very slightly less prevalent and less fatal than in the preceding year; an increase in the admissions by the febrile group was more than counterbalanced by a decrease in the constitutional. The admissions and deaths by the principal diseases of this class were as follows:—

*Madras.*

| General Diseases. | Admitted. | Died. | Ratio per 1,000 of Mean Strength. | | | |
|---|---|---|---|---|---|---|
| | | | 1870. | | 1869. | |
| | | | Admitted. | Died. | Admitted. | Died. |
| *Febrile—* | | | | | | |
| Eruptive Fevers .. .. | 2 | .. | ·2 | .. | 1·2 | ·29 |
| Continued „ .. .. | 774 | 10 | 77·9 | 1·00 | 86·8 | 1·46 |
| Paroxysmal „ .. .. | 1,528 | 6 | 153·8 | ·60 | 125·5 | ·97 |
| Malignant Cholera .. .. | 55 | 37 | 5·5 | 3·75 | 3·8 | 2·24 |
| Choleraic Diarrhœa .. .. | .. | .. | .. | .. | 1·7 | ·29 |
| Influenza .. .. .. | 18 | .. | 1·8 | .. | 2·6 | .. |
| Erysipelas .. .. .. | 20 | .. | 2·0 | .. | 1·5 | .. |
| Other Diseases of this group | 3 | .. | ·3 | .. | ·5 | ·10 |
| *Constitutional—* | | | | | | |
| Rheumatism .. .. .. | 426 | .. | 42·9 | .. | 51·5 | .. |
| Syphilis .. .. .. | 994 | 2 | 100·1 | ·20 | 114·2 | ·29 |
| Scrofula, Phthisis, &c. .. | 129 | 12 | 13·0 | 1·21 | 14·7 | 1·75 |
| Scurvy and Purpura .. | 13 | .. | 1·3 | .. | ·8 | ·10 |
| Anæmia .. .. .. | 69 | .. | 6·9 | .. | 7·2 | .. |
| Other Diseases of this group | 6 | 5 | ·6 | ·50 | 1·5 | ·10 |

The admissions were lower than in the preceding year by all these diseases except *paroxysmal fevers, cholera,* and *erysipelas.* There was an increase in the first of these to the extent of about 28 per 1,000; the admissions by *cholera* were exactly the same as by it and choleraic diarrhœa in 1869; but the deaths were in excess of that year by 1·22 per 1,000. There was a remarkable absence of eruptive fevers, only two admissions appearing under that head, one by measles and one by cow-pox. The decrease in the proportion of admissions was greatest in *syphilis* amounting to 14 per 1,000. Of the five deaths by "other diseases" of the constitutional group, three were by cancer and two by general dropsy.

Local Diseases did not differ greatly from the preceding year. There was an increase in diseases of the absorbent system and in the cases of general debility, and a decrease in diseases of the digestive and urinary systems, and under the head of alcoholic poisoning.

The admissions and deaths during the year at the principal military stations in the Command were as follows:—

| Stations. | | Average Annual Strength. | Admitted into Hospital. | Died in India. | Ratio per 1,000 of Strength. | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Admitted. | Died. | Average of previous Period. | |
| | | | | | | | Admitted. | Died. |
| Presidency Circle. | Fort St. George and Palaveram | 851 | 842 | 23 | 989·4 | 27·03 | 1611·3 | 20·78 |
| | St. Thomas's Mount | 452 | 582 | 24 | 1287·6 | 53·10 | | |
| | Trichinopoly .. | 272 | 422 | 6 | 1551·5 | 22·06 | 1445·1 | 16·42 |
| Mysore Circle. | Bangalore .. | 1,015 | 1,183 | 10 | 1165·5 | 9·85 | 1033·9 | 14·51 |
| | Cannanore* .. | 812 | 770 | 11 | 948·3 | 13·55 | 1127·7 | 14·10 |
| | Bellary .. .. | 918 | 1,044 | 6 | 1137·3 | 6·53 | 1465·2 | 15·79 |
| Hydrabad Circle. | Secunderabad .. | 2,049 | 2,284 | 40 | 1114·7 | 19·52 | 1518·0 | 24·06 |
| | Kamptee† .. | 1,074 | 1,795 | 12 | 1671·3 | 11·17 | 1663·7 | 20·25 |
| Birmah Circle. | Rangoon .. .. | 751 | 1,205 | 7 | 1604·5 | 9·32 | 1295·6 | 13·64 |
| | Thayetmyo .. | 432 | 746 | 30 | 1726·9 | 69·44 | 1392·4 | 25·32 |
| | Tonghoo .. .. | 332 | 366 | 8 | 1102·4 | 24·09 | 1256·6 | 14·68 |
| | Port Blair .. | 112 | 64 | 2 | 570·4 | 17·85 | 1475·9 | 13·01 |
| Depôts .. | Poonamallee .. | 154 | 452 | 7 | 2935·0 | 45·45 | 2652·5 | 75·44 |
| | Ramandroog .. | 47 | 43 | .. | 914·9 | .. | 1891·8 | 42·21 |
| | Wellington .. | 409 | 723 | 4 | 1767·7 | 9·77 | 1169·7 | 17·50 |
| Troops on the March .. .. | | 253 | 173 | 19 | 668·2 | 75·09 | .. | .. |

* Including detachments at Calicut and Malleapooram.
† Including detachments at Seetabuldee and Chindwarrah.

Compared with the preceding year there was a reduction in the ratio of admissions at Fort St. George, Bellary, Secunderabad, Kamptee, Rangoon, Port Blair, and the Depôt at Poonamallee, and in the deaths at Bangalore, Cannanore, Bellary, Secunderabad, Kamptee, Rangoon, and at all the Depôts. Omitting the Depôts, Thayetmyo and Kamptee furnished the highest ratio of admissions. The ratio of deaths was highest at Thayetymo from a severe outbreak of cholera; the ratio was also very high at St. Thomas's Mount, part of the excess being due to the occurrence of seven cases of heat apoplexy in the end of April and beginning of May.

The prevalence and mortality of the different classes of diseases in each of the Circles is shown in the following Tables:—

| Orders. | Stations | Presidency Circle. | | Mysore Circle. | | Hydrabad Circle. | | Birmah Circle. | | Depôts. | | On the March. | | Presidency Circle. | | Mysore Circle. | | Hydrabad Circle. | | Birmah Circle. | | Depôts. | | On the March. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Strength | 1,564 | | 2,745 | | 3,123 | | 1,627 | | 621 | | 253 | | Annual Ratio per 1,000 of Strength. | | | | | | | | | | | |
| | Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| | I. *General Diseases.* | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Febrile Group .. ... ... | 270 | 10 | 358 | 4 | 1,066 | 11 | 447 | 27 | 229 | ... | 28 | ... | 172·6 | 6·39 | 130·4 | 1·45 | 341·3 | 3·52 | 274·7 | 16·60 | 368·8 | ... | 110·7 | ... |
| 2 | Constitutional ,, ... ... ... | 216 | 3 | 391 | 5 | 525 | 4 | 256 | ... | 227 | 1 | 22 | 3 | 138·1 | 1·92 | 142·4 | 1·82 | 168·1 | 1·28 | 157·4 | ... | 365·5 | 1·61 | 86·9 | 11·86 |
| | II. *Local Diseases.* Diseases of the— | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Nervous System ... ... ... | 48 | 12 | 23 | 3 | 61 | 4 | 26 | 5 | 40 | ... | ... | ... | 30·7 | 7·67 | 8·4 | 1·09 | 19·5 | 1·28 | 16·0 | 3·07 | 64·4 | ... | ... | ... |
| 2 | Eye ... ... ... ... ... | 39 | ... | 66 | ... | 77 | ... | 48 | ... | 22 | ... | 2 | ... | 24·9 | ... | 24·0 | ... | 24·7 | ... | 29·5 | ... | 35·4 | ... | 7·9 | ... |
| 3 | Ear ... ... ... ... ... | 8 | ... | 22 | ... | 17 | ... | 20 | ... | 6 | ... | 1 | ... | 5·1 | ... | 8·0 | ... | 5·4 | ... | 12·3 | ... | 9·7 | ... | 3·9 | ... |
| 4 | Nose ... ... ... ... ... | ... | ... | 1 | ... | 4 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ·4 | ... | 1·3 | ... | ... | ... | ... | ... | ... | ... |
| 5 | Circulatory System ... ... ... | 20 | 3 | 62 | 7 | 23 | 5 | 15 | 1 | 9 | 2 | ... | 1 | 12·8 | 1·92 | 22·6 | 2·55 | 7·4 | 1·60 | 9·2 | ·61 | 14·5 | 3·22 | ... | 3·95 |
| 6 | Absorbent ,, ... ... ... | 20 | ... | 74 | ... | 123 | ... | 48 | ... | 16 | ... | 5 | ... | 12·8 | ... | 27·0 | ... | 39·4 | ... | 29·5 | ... | 25·8 | ... | 19·8 | ... |
| 8 | Respiratory ,, ... ... ... | 84 | 2 | 127 | 1 | 111 | 2 | 75 | ... | 47 | 1 | 4 | ... | 53·7 | 1·28 | 46·3 | ·37 | 35·5 | ·64 | 46·1 | ... | 75·7 | 1·61 | 15·8 | ... |
| 9 | Digestive ,, ... ... ... | 402 | 17 | 871 | 5 | 1,044 | 23 | 585 | 4 | 397 | 6 | 64 | 12 | 257 0 | 10·87 | 317·3 | 1·82 | 334·3 | 7·37 | 359·6 | 2·46 | 639·3 | 9·66 | 253·0 | 47·43 |
| 10 | Urinary ,, ... ... ... | 148 | ... | 177 | ... | 254 | 1 | 117 | ... | 37 | ... | 11 | ... | 94·6 | ... | 64·5 | ... | 81·3 | ·32 | 71·9 | ... | 59·6 | ... | 43·5 | ... |
| 11 | Generative ,, ... ... ... | 27 | ... | 47 | ... | 57 | ... | 23 | ... | 7 | ... | ... | ... | 17·3 | ... | 17·1 | ... | 18·3 | ... | 14·1 | ... | 11·3 | ... | ... | ... |
| 12 | Organs of Locomotion ... ... | 7 | ... | 16 | ... | 20 | ... | 10 | ... | 2 | ... | 2 | ... | 4·5 | ... | 5·8 | ... | 6·4 | ... | 6·1 | ... | 3·2 | ... | 7·9 | ... |
| 13 | Cellular Tissue ... ... ... | 21 | ... | 53 | ... | 55 | ... | 20 | ... | 5 | ... | 1 | ... | 13·4 | ... | 19·3 | ... | 17·6 | ... | 12·3 | ... | 8·0 | ... | 3·9 | ... |
| 14 | Cutaneous System ... ... ... | 170 | ... | 321 | ... | 245 | ... | 203 | ... | 49 | ... | 6 | ... | 108·7 | ... | 116·9 | ... | 78·5 | ... | 124·8 | ... | 78·9 | ... | 23·7 | ... |
| | III. *Conditions, &c.* | | | | | | | | | | | | | | | | | | | | | | | | |
| | Debility... ... ... ... ... | 127 | ... | 41 | ... | 68 | ... | 198 | ... | 66 | ... | 23 | ... | 81·2 | ... | 14·9 | ... | 21·8 | ... | 121·7 | .. | 106·3 | ... | 90·9 | ... |
| | IV. *Poisons* ... ... | 32 | ... | 15 | 1 | 14 | 1 | 29 | 2 | 11 | ... | ... | ... | 20·5 | ... | 5·5 | ·37 | 4·5 | ·32 | 17·8 | 1·23 | 17·7 | ... | ... | ... |
| | V. *Injuries.* | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Accidental ... ... ... ... | 189 | 5 | 325 | ... | 312 | ... | 260 | 6 | 64 | 1 | 4 | 3 | 120·8 | 3·20 | 118·4 | ... | 99·9 | ... | 159·8 | 3·69 | 103·0 | 1·61 | 15·8 | 11·86 |
| 3 | Self-inflicted ... ... ... ... | 2 | 1 | ... | 1 | ... | 1 | ... | 2 | ... | ... | ... | ... | 1·3 | ·64 | ... | ·37 | ... | ·32 | ... | 1·23 | ... | ... | ... | ... |
| | VI. *Surgical Operations* ... | ... | ... | 1 | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ·4 | ... | ... | ... | ·6 | ... | ... | ... | ... | ... |
| | No appreciable disease ... ... | ... | ... | 6 | ... | 3 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 2·2 | ... | ·9 | ... | ... | ... | ... | ... | ... | ... |
| | Total ... ... ... ... | 1,830 | 53 | 2,997 | 27 | 4,079 | 52 | 2,381 | 47 | 1,234 | 11 | 173 | 19 | 1170·0 | 33·89 | 1091·8 | 9·84 | 1306·1 | 16·65 | 1463·4 | 28·89 | 1987·1 | 17·71 | 683·7 | 75·10 |

| Stations ... ... ... | Presidency Circle. | | Mysore Circle. | | Hydrabad Circle. | | Birmah Circle. | | Depôts. | | On the March. | | Presidency Circle. | | Mysore Circle. | | Hydrabad Circle. | | Birmah Circle. | | Depôts. | | On the March. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Strength ... ... ... ... | 1,564 | | 2,745 | | 3,123 | | 1,627 | | 621 | | 253 | | Annual Ratio per 1,000 of Mean Strength. | | | | | | | | | | | |
| General Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| *Febrile—* | | | | | | | | | | | | | | | | | | | | | | | | |
| Eruptive Fevers ... ... ... | ... | ... | ... | ... | ... | ... | 1 | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ·6 | ... | ... | ... | 3·9 | ... |
| Continued ,, ... ... ... | 113 | 3 | 248 | 1 | 202 | 6 | 188 | ... | 22 | ... | 1 | ... | 72·2 | 1·92 | 90·4 | ·36 | 64·7 | 1·92 | 115·5 | ... | 35·4 | ... | 3·9 | ... |
| Paroxysmal Fevers ... ... ... | 147 | 1 | 97 | ... | 847 | 4 | 213 | ... | 198 | ... | 25 | ... | 94·0 | ·64 | 35·3 | ... | 271·2 | 1·28 | 130·9 | ... | 318·9 | ... | 98·5 | ... |
| Malignant Cholera ... ... ... | 8 | 6 | 5 | 3 | 1 | 1 | 37 | 27 | 4 | ... | ... | ... | 5·1 | 3·83 | 1·8 | 1·09 | ·3 | ·32 | 22·7 | 16·60 | 6·4 | ... | ... | ... |
| Choleraic Diarrhœa ... ... | ... | ... | ... | ... | ... | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1·6 | ... | ... | ... |
| Influenza ... ... ... ... | ... | ... | 5 | ... | 9 | ... | 4 | ... | ... | ... | ... | ... | ... | ... | 1·8 | ... | 2·9 | ... | 2·5 | ... | ... | ... | ... | ... |
| Erysipelas ... ... .. ... | 2 | ... | 3 | ... | 7 | ... | 4 | ... | 4 | ... | ... | ... | 1·3 | ... | 1·1 | ... | 2·2 | .. | 2·5 | ... | 6·4 | ... | ... | ... |
| Other Diseases of this Group ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 3·9 | ... |
| *Constitutional—* | | | | | | | | | | | | | | | | | | | | | | | | |
| Rheumatism ... ... ... ... | 28 | ... | 118 | ... | 103 | ... | 110 | ... | 66 | ... | 4 | ... | 17·9 | ... | 43·0 | ... | 33·0 | ... | 67·6 | ... | 106·3 | ... | 15·8 | ... |
| Syphilis ... ... ... ... | 153 | ... | 239 | ... | 368 | 1 | 121 | ... | 101 | 1 | 11 | ... | 97·8 | ... | 87·1 | ... | 117·8 | ·32 | 74·4 | ... | 162·6 | 1·61 | 43·5 | ... |
| Scrofula, Phthisis, &c. ... ... | 22 | 3 | 19 | 2 | 20 | 3 | 12 | ... | 47 | ... | 6 | 2 | 14·1 | 1·92 | 6·9 | ·73 | 6·4 | ·96 | 7·4 | ... | 75·7 | ... | 23·7 | 7·90 |
| Scurvy and Purpura ... ... | 2 | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1·3 | ... | ·3 | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Anæmia ... ... ... ... | 9 | ... | 3 | ... | 31 | ... | 12 | ... | 13 | ... | 1 | ... | 5·7 | ... | 1·1 | ... | 9·9 | ... | 7·4 | ... | 20·9 | ... | 3·9 | ... |
| Other Diseases of this Group ... | 2 | ... | 11 | 3 | 3 | ... | 1 | ... | ... | ... | ... | 1 | 1·3 | ... | 4·0 | 1·09 | 1·0 | .. | ·6 | ... | ... | ... | ... | 3·95 |

*Madras.* General Diseases were less prevalent than in 1869 in all the Circles except the Presidency and Birmah. The ratio of mortality was above the preceding year in the Mysore and Birmah Circles and among troops on the march, and lower in the other two Circles and at the Depôts.

*Continued fevers* were rather more prevalent than in 1869 in the Presidency, Mysore and Birmah Circles, and less prevalent in the others. The increase was greatest in Birmah, amounting to 15 per 1,000, and arising principally from the admission of a large number of cases of febricula in the 2nd Battalion 21st Regiment at Rangoon, stated by the Surgeon of the regiment to have been caused chiefly by intemperance. The 2nd Battalion 24th Regiment, which suffered so much from fever in 1869, had still a high ratio of admissions, although less than half the proportion of the preceding year and with a great diminution in the number of deaths.

*Paroxysmal fevers* were considerably more prevalent in the Presidency and Hydrabad Circles, and there was a slight increase in Birmah. The Hydrabad Circle had much the highest proportion of cases, the excess, as in the preceding year, chiefly at Kamptee from ague. The admissions were most numerous in the 79th Regiment, 530 cases having occurred in it out of 624 at the station; ague prevailed to the greatest extent in July, August and September. The ratio of admissions was also high in the Birmah Circle; the excess was principally at Thayetmyo, in the Head-Quarter Wing of the 76th Regiment, the Battery of the Artillery at the same station enjoying almost an immunity from these forms of fever. Ague prevailed in the 76th from the end of April, when the epidemic of cholera ceased, till the middle of July, when it was deemed advisable to invalid a number of the men who had suffered most from this disease and from debility consequent upon repeated attacks.

*Cholera* broke out in the 45th Regiment at Fort St. George in the end of February; it prevailed in an aggravated form as an epidemic at Thayetymo in Birmah from April till July, and there was a slight outbreak at Bangalore in July. In the 45th Regiment a fatal case of cholera occurred among the men in the middle of February, and on the 2nd March a case among the women; on the 3rd a man was admitted with the disease, followed by another on the 4th and by four on the 5th; five of these cases were from one part of the barracks. It was decided to remove immediately the two companies in which the cases had occurred into camp at Red Hills, nine miles distant; which was accordingly done on the evening of the 5th. One case occurred in the camp on the 6th and three on the 9th, and the disease then ceased. After the removal of the two companies there was only one other fatal case in the barrack; altogether, between the 3rd and 9th of March inclusive, 11 cases and 5 deaths occurred. The fatal case on the 2nd was the only one among the women.

At Thayetymo on the 4th April two native servants of the 76th Regiment were attacked with cholera. On the 7th it broke out among the men of the regiment, seven cases being admitted on that day; the regiment was immediately moved into camp and the disease then ceased. In the end of June another fatal case occurred, when cholera was prevalent in the Artillery. During this epidemic in the 76th Regiment there was only one case in the A Battery 23rd Brigade Royal Artillery at the same station. In the end of May, however, the disease again appeared in the Battery, and cases continued to occur in it till the 5th July. The disease ceased, as in the 76th Regiment, on the battery being moved into camp across the Irrawaddy. There were altogether 28 cases and 21 deaths among the men, 2 fatal cases among the women, and 2 cases also fatal among the children of the 76th Regiment; and there were 8 cases and 6 deaths among the men, 1 fatal case among the women, and 3 cases with 2 deaths among the children of the Royal Artillery.

At Bangalore, cholera was prevailing epidemically among the civil population in the neighbourhood of the station in July. On the 19th of the month, the disease appeared in the 16th Lancers, giving rise to 5 admissions and 3 deaths among the men; the women and children escaped. In the end of July the 1st Battalion 21st Regiment had two fatal cases among the men and four cases with three deaths among the women.

*Rheumatism.*—Omitting the Depôts for obvious reasons, there was a decrease in the prevalence of this disease in all the circles. There was also a

decrease in the admissions by *Syphilis* in all the circles, but especially in Birmah, and this was still more marked among troops on the march. The proportion of admissions from syphilis was, however, still very high, having amounted to 10 per cent. of the strength.

*Scrofula and Phthisis* were slightly less prevalent, but the number of cases and deaths is so small that a lengthened period of observation would be necessary to justify any deductions as to any change in the conditions upon which these diseases may be supposed to depend.

LOCAL DISEASES.—Those of the nervous system were more prevalent and fatal than in 1869 in the Presidency Circle, from the occurrence of 20 cases of heat apoplexy, and 5 deaths in the A Battery 9th Brigade Royal Artillery at St. Thomas's Mount, in the end of April and early part of May; in all the other circles there was a reduction, except in the deaths in Birmah, which were very slightly higher.

*Diseases of the Eyes* were slightly more prevalent than in 1869 in the Presidency and Birmah Circles, and less prevalent in the others; but they were not a cause of much inefficiency in any of them, nor did they prevail as an epidemic. The ratio was highest in the Birmah Circle, the excess occurring entirely in the 2nd Battalion 21st Regiment; the Medical Officer in charge does not seem to have thought them sufficiently prevalent to require special notice.

*Diseases of the Circulatory System* were less prevalent than in 1869 in all the Circles except the Mysore and Presidency; in the former the ratio was nearly double that of the preceding year. The excess was caused by the admission of 26 cases of palpitation of the heart in the 3rd Battalion 60th Regiment at Bellary, attributed chiefly to the high temperature acting on men whose constitutions had been impaired by previous disease or intemperance, and upon young soldiers recently arrived in the country.

*Diseases of the Respiratory System.*—There was an increase in the prevalence of these diseases in the Presidency and Mysore Circles, but there was no remarkable excess at any of the stations.

*Diseases of the Digestive System* gave rise to a considerably higher ratio of admissions and deaths than in 1869 in the Presidency Division, but there was a decrease in all the other Divisions. The deaths, however, at the Depôts and on the march, were considerably higher than in the preceding year. Dyspepsia caused the largest number of admissions in this class, but dysentery, diarrhœa, and hepatitis were the most important of the diseases comprised in it. The admissions and deaths by these three combined were in the following proportion at each of the principal stations in the Command:—

| Stations. | Admitted. | Died. | Stations. | Admitted. | Died. |
|---|---|---|---|---|---|
| Fort St. George and Palaveram .. .. | 90·4 | 3·52 | Secunderabad .. | 302·6 | 8·78 |
| St. Thomas's Mount.. | 256·6 | 24·33 | Kamptee .. .. | 88·4 | 2·79 |
| Trichinopoly .. .. | 224·3 | 11·03 | Rangoon .. .. | 206·4 | .. |
| Bangalore .. .. | 133·0 | ·98 | Thayetmyo .. .. | 280·0 | 4·63 |
| Cannanore .. .. | 213·0 | 4·93 | Tonghoo .. .. | 174·7 | 6·02 |
| Bellary .. ... | 203·7 | .. | Port Blair .. .. | 44·6 | .. |

There has been a decrease, compared with the amount in 1869, in the admissions and deaths by these three diseases at Fort St. George, Bangalore, and Rangoon; and on the admissions at Kamptee and Port Blair, and in the deaths at Cannanore and Bellary, while there has been an increase at the other stations, most marked in the admissions at Thayetmyo and in the deaths at St. Thomas's Mount. As in 1869, the highest ratio of cases still occurred at Secunderabad, but the highest ratio of deaths at St. Thomas's Mount.

*Madras.* *Diseases of the Urinary System* continue to be most prevalent in the Presidency, and also above the average in the Hydrabad Circles; in the former the excess was greatest at St. Thomas's Mount, but also considerable at Fort St. George; in the latter it occurred at Thayetmyo; but on the whole there has been a satisfactory reduction in the proportion of admissions, chiefly in cases of gonorrhœa and bubo.

Conditions, &c.—The admissions under the head of debility were considerably higher than in the preceding year in the Birmah Circle. The excess occurred chiefly at Thayetmyo in the wing of the 76th Regiment, and was due to the great prevalence of fever and general sickly state of the wing after the epidemic of cholera in April; in a strength of 472 men, there were 111 admissions under the head of debility; while in the other wing of the corps stationed at Rangoon there were only 8 cases so returned in a strength of 291 men.

Poisons.—The irregularity caused in the results by returning cases resulting from intemperance under this head, as alluded to in last report, has ceased at all the stations except St. Thomas's Mount, where 20 cases were thus returned by the Medical Officers in charge of the Royal Artillery. There has been a decrease in the proportion of admissions and deaths by delirium tremens throughout the Command, a very slight increase having taken place at the Depôts, while there has been a decrease in all the Circles, as will be seen by the following Table:—

| Circle. | Admitted for Delirium Tremens. | Died. | Ratio per 1,000 of Strength. | | | |
|---|---|---|---|---|---|---|
| | | | 1870. | | 1869. | |
| | | | Admitted. | Died. | Admitted. | Died. |
| Presidency .. .. | 10 | .. | 6·4 | .. | 19·7 | 1·85 |
| Mysore .. .. .. | 14 | .. | 5·1 | .. | 9·3 | ·93 |
| Hydrabad .. .. .. | 12 | 1 | 3·8 | ·32 | 6·6 | 1·05 |
| Birmah .. .. .. | 27 | 2 | 16·6 | 1·23 | 18·2 | ·59 |
| Depôts .. .. .. | 10 | .. | 16·1 | .. | 15·4 | .. |
| On the March .. .. | .. | .. | .. | .. | 4·9 | .. |

In addition to these three deaths from delirium tremens, one occurred in the 16th Lancers at Bangalore by alcoholic poisoning. Of the 27 cases which were admitted into hospital in Birmah, 16 occurred in the 2nd Battalion 21st Regiment at Rangoon, 8 in the Royal Artillery, and 3 in the wing of the 76th Regiment at Tonghoo.

The admissions and deaths in each corps serving in the Command were as follows:—

| Regiments. | Average Annual Strength. | Admitted into Hospital. | Deaths. In India. | Deaths. Of Invalids. | Deaths. Total. | Annual Ratio per 1,000. Admitted. | Annual Ratio per 1,000. Died. | Stations during the Year. | months. |
|---|---|---|---|---|---|---|---|---|---|
| CAVALRY. | | | | | | | | | |
| 16th Lancers .. | 486 | 542 | 8 | 1 | 9 | 1,115·2 | 18·52 | Bangalore | 12 |
| 18th Hussars .. | 399 | 557 | 11 | 5 | 16 | 1,396·0 | 40·10 | Secunderabad | 12 |
| Total Cavalry .. | 885 | 1,099 | 19 | 6 | 25 | 1,241·8 | 28·25 | | |
| RL. ARTILLERY. | | | | | | | | Batt. | |
| | | | | | | | | A, Kamptee | 12 |
| | | | | | | | | B, Bellary | 12 |
| D Brigade R.H.A. | 562 | 862 | 6 | 2 | 8 | 1,533·8 | 14·23 | C, Secunderabad | 12 |
| | | | | | | | | D, Bangalore | 12 |
| | | | | | | | | No. 1, Rangoon | 12 |
| | | | | | | | | No. 2, Fort St. George | 12 |
| | | | | | | | | No. 3, Tonghoo | 12 |
| 5th Brigade R.A. | 425 | 559 | 12 | 2 | 14 | 1,315·3 | 32·94 | No. 4, St. Thomas's Mount | 12 |
| | | | | | | | | No. 5, Rangoon | 12 |
| | | | | | | | | No. 6, St. Thomas's Mount | 12 |
| | | | | | | | | A, St. Thomas's Mount | 12 |
| 9th ,, ,, | 421 | 691 | 21 | .. | 21 | 1,641·3 | 49·88 | C, Kamptee | 12 |
| | | | | | | | | G, Secunderabad | 12 |
| | | | | | | | | A, Bellary | 12 |
| | | | | | | | | B, Trichinopoly | 12 |
| | | | | | | | | C, Secunderabad | 12 |
| | | | | | | | | D, Cannanore | 9 1/3 |
| 20th ,, ,, | 629 | 832 | 16 | 3 | 19 | 1,322·7 | 30·21 | On march Kamptee | 1/3 2 1/3 |
| | | | | | | | | E, Kamptee | 9 1/3 |
| | | | | | | | | On march Cannanore | 1/3 2 1/3 |
| | | | | | | | | A, Thayetmyo | 12 |
| 23rd ,, ,, | 642 | 774 | 12 | 1 | 13 | 1,205·6 | 20·25 | B, St. Thomas's Mount | 12 |
| | | | | | | | | C & D, Bangalore | 12 |
| | | | | | | | | 5, Secunderabad | 12 |
| Total Rl. Artillery | 2,679 | 3,718 | 67 | 8 | 75 | 1,387·9 | 27·99 | | |

*Madras.*

| Regiments. | Average Annual Strength. | Admitted into Hospital. | Deaths. In India. | Deaths. Of Invalids. | Deaths. Total. | Annual Ratio per 1,000. Admitted. | Annual Ratio per 1,000. Died. | Stations during the Year. |
|---|---|---|---|---|---|---|---|---|
| INFANTRY. | | | | | | | | months. |
| 1st Bn. 1st Foot | 635 | 579 | 12 | .. | 12 | 911·8 | 18·89 | Cannanore 9<br>Embarked for England. |
| 2nd „ 10th „ .. | 688 | 692 | 15 | 3 | 18 | 1,005·8 | 26·16 | Secunderabad 11<br>On march 1 |
| 2nd „ 21st „ .. | 842 | 1,292* | 8 | 1 | 9 | 1,534·5 | 10·69 | Rangoon 12 |
| 2nd „ 24th „ .. | 712 | 784 | 11 | 3 | 14 | 1,101·1 | 19·66 | Secunderabad 12 |
| 45th Foot .. | 926 | 936 | 22 | 1 | 23 | 1,010·8 | 24·84 | Fort St. George 12<br>with Detachments. |
| 3rd Bn. 60th Foot | 880 | 1,010 | 6 | .. | 6 | 1,147·7 | 6·82 | Bellary 12 |
| 76th Foot .. | 472 | 861 | 31 | 3 | 42 | 1,824·2 | 55·05 | Thayetmyo 8<br>Tharangoon 3½<br>Rangoon ½ |
| „ Left Wing | 291 | 295 | 8 | | | 1,013·7 | | Tonghoo 11½<br>Rangoon ½ |
| 79th Foot .. | 777 | 1,251 | 9 | 1 | 10 | 1,610·1 | 12·87 | Kamptee 12<br>with Detachments. |
| 89th Foot .. | 133 | 197 | .. | .. | .. | 1,481·2 | .. | Arrived from England.<br>Cannanore 1¾ |
| Total Infantry.. | 6,356 | 7,897 | 122 | 12 | 134 | 1,242·4 | 21·08 | |

The admissions were highest in the Artillery; in the Cavalry and Infantry they were identical. The mortality was lowest in the Infantry and highest in the Cavalry, but the difference between the latter and the Artillery was very trifling.

In the Cavalry, the 16th Lancers, at Bangalore, had the lowest ratio both of admissions and deaths. In the Artillery, the 9th Brigade, at St. Thomas's Mount, Kamptee, and Secunderabad, had the highest ratio of admissions and deaths, the lowest of admissions being in the 23rd Brigade at Thayetmyo, St. Thomas's Mount, Bangalore, and Secunderabad, and of deaths in the D Brigade Royal Horse Artillery, at Kamptee, Bellary, Secunderabad, and Bangalore.

In the Infantry, the 79th Regiment, at Kamptee, furnished the highest proportion of admissions, and the 76th, in Birmah, of deaths; the admissions also in the right wing of the latter, at Thayetmyo, were much above the average. The lowest ratio of admissions was in the 1st Battalion 1st Regiment, at Cannanore, and of deaths in the 3rd Battalion 60th, at Bellary.

### 1ST BATTALION 21ST REGIMENT, AT BANGALORE.

This corps, as already stated, was moved from Kurrachee in Bombay to Bangalore, on account of the great and continued prevalence of fever in it. It reached Bangalore on the 24th January, and remained there during the rest of the year. The average annual strength of the corps during that time was 797, the admissions into hospital were 3,173, and the deaths 18, of which 12 occurred in and 1 out of hospital, and 5 among invalids on their passage home. These numbers give the ratio of 3,981 admissions and 22·59 deaths per 1,000 of mean strength. The admissions during the year, therefore, were within a fraction in the proportion of four to every man serving. The influence of the different classes of diseases in causing this very high ratio is shown in the following Table framed from Abstract No. 20 in the Appendix:—

| Orders. | Diseases. | 1st Battn. 21st Regiment, Strength, 797. | | | | Ratio per 1,000 of Mean Strength. | |
|---|---|---|---|---|---|---|---|
| | | Admitted. | Deaths. | | | Admitted. | Died. |
| | | | In the Command. | Of Invalids. | Total. | | |
| | I. *General Diseases.* | | | | | | |
| 1 | Febrile Group .. .. | 2,528 | 7 | .. | 7 | 3171·9 | 8·78 |
| 2 | Constitutional „ .. .. | 87 | 1 | 2 | 3 | 109 2 | 3·77 |
| | II. *Local Diseases.* | | | | | | |
| | Diseases of the— | | | | | | |
| 1 | Nervous System .. .. .. | 5 | .. | .. | .. | 6·2 | .. |
| 2 | Eye .. .. .. .. | 8 | .. | .. | .. | 10·0 | .. |
| 3 | Ear .. .. .. .. | 3 | .. | .. | .. | 3·8 | .. |
| 4 | Nose .. .. .. .. | 1 | .. | .. | .. | 1·2 | .. |
| 5 | Circulatory System .. .. | 38 | 1 | .. | 1 | 47·7 | 1·26 |
| 6 | Absorbent „ .. .. | 25 | .. | .. | .. | 31·4 | .. |
| 8 | Respiratory „ .. .. | 25 | .. | .. | .. | 31·4 | .. |
| 9 | Digestive „ .. .. | 223 | 4 | 2 | 6 | 279·8 | 7·52 |
| 10 | Urinary „ .. .. | 35 | .. | .. | .. | 43·9 | .. |
| 11 | Generative „ .. .. | 10 | .. | .. | .. | 12·5 | .. |
| 12 | Organs of Locomotion .. .. | .. | .. | 1 | 1 | .. | 1·26 |
| 13 | Cellular Tissue .. .. .. | 5 | .. | .. | .. | 6·3 | .. |
| 14 | Cutaneous System .. .. | 50 | .. | .. | .. | 62·7 | .. |
| | III. *Conditions, &c.* | | | | | | |
| | Debility .. .. .. .. | 14 | .. | .. | .. | 17·6 | .. |
| | IV. *Poisons* .. .. | 14 | .. | .. | .. | 17·6 | .. |
| | V. *Injuries* | | | | | | |
| 2 | Accidental.. .. .. .. | 102 | .. | .. | .. | 128·0 | .. |
| | Total .. .. .. | 3,173 | 13 | 5 | 18 | 3981·2 | 22·59 |

This Table shows four-fifths of the admissions to have been caused by the febrile group of General Diseases. All the cases in this group but 23 were returned as ague, but none of those under that head were fatal. Of the deaths, three were by enteric and two by remittent fevers, of each of which seven cases were admitted into hospital, and the other two deaths were by malignant cholera. Of the other fifth of the admissions, one-third was caused by diseases of the digestive system, chiefly dysentery and diarrhœa, probably the result of the malarious poison which produced the fever. If these diseases, which may be fairly deemed to have been generated at Kurrachee be deducted, there remains little of importance in the medical history of the corps. Hepatitis gave rise to 24 cases, of which three terminated fatally. Syphilis and gonorrhœa prevailed to a very slight extent. There were 33 admissions for palpitation of the heart, a result probably of the anæmic condition generated by the fever.

During the year, it was found necessary to send to England as invalids no fewer than 171 men, being in the ratio of 214 per 1,000 of mean strength. Of these, besides 89 men invalided for ague, there were 41 for general debility,

*M dras.* 12 for splenitis, 4 for anæmia, and 3 for palpitation, all of them undoubtedly the result of fever.

From a careful examination of returns of this regiment, it appears that malarious diseases alone caused 340 admissions in every 100 men serving, and led to 19 per cent. being sent to England as invalids.

The steady improvement which took place in the health of the regiment at Bangalore may be judged from the following statement of the admissions into hospital in each month, and the number sick on the last day of each month, after its arrival at that station :—

| | Admitted into Hospital. | Sick on last day of month. | | Admitted into Hospital. | Sick on last day of month. |
|---|---|---|---|---|---|
| February .. | 501 | 138 | August .. | 228 | 68 |
| March .. .. | 341 | 124 | September .. | 196 | 42 |
| April .. .. | 427 | 125 | October .. | 105 | 42 |
| May .. .. | 389 | 158 | November .. | 107 | 52 |
| June .. .. | 433 | 120 | December .. | 77 | 26 |
| July .. .. | 294 | 146 | | | |

The marked reduction in the number of sick on the last day of August may probably have been to some extent due to invaliding ; but the state of the corps in December, as tested by the admissions and number of sick appears very satisfactory.

The other diseases require no comment.

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SANITARY REPORT.

Inspector-General Currie, M.D., C.B., in his Sanitary Report for the Madras Presidency, makes the following remarks :—

*Presidency Circle.*—Fort St. George Barracks. These have been too often described for me to attempt to do so in detail—suffice it to state that the barracks occupied by the regiment are double-storied, flat-roofed buildings, and both upper and lower rooms are occupied by the troops. The lower rooms, in some instances, are too much enclosed by neighbouring buildings to admit of free lateral ventilation. If sufficient upper room accommodation could be provided, it would be desirable to convert the lower ones into stores or offices.

The battery of Artillery stationed at Fort St. George occupies bomb-proof barracks ; and though these are deficient in certain requirements, as bomb-proof barracks usually are, the battery has been very healthy during the year.

The married quarters are very good and consist of two rooms to each family, with verandah in front and behind.

*Depôt Poonamallee.*—The barracks here are very old and the accommodation very inferior. The buildings are low and narrow, with tiled roofs, and are scarcely fit for occupation in a tropical climate. They have long since been condemned, and new barracks for the depôt have been recommended to be substituted at Ennore, close to the sea, but want of funds has prevented this proposition from being carried out.

*St. Thomas's Mount.*—No change has been made in the barrack accommodation here during the year. It consists of two distinct sets of buildings, viz., the North and South, and Horse Artillery Barracks, the latter being about a quarter of a mile distant from the two former.

The ventilation and general sanitary condition of these one-storied barracks is considered good, and there is no over-crowding.

There are 20 married quarters belonging to the North and South Barracks, each family having two rooms.

The married quarters of the Horse Artillery, 32 in number, are of a very superior description, and are on the cottage system, with a small compound to each, and provided with cook-house and latrine at opposite corners of the enclosure.

*Wellington.*—The barrack accommodation at this sanitarium is very good and sufficient for 560 men and 120 married families.

The buildings are of brick and mortar, double storied and well ventilated. There is a fireplace at the end of each room.

*Trichinopoly.*—The state of the barracks here is reported satisfactory, and there is no over-crowding.

*Mysore Circle.*—There have been no changes in the barracks at Bangalore during the past year. They are generally favourably reported on; the accommodation being ample, and no important sanitary defects being complained of.

Deputy Inspector-General Barclay states, "The large block on the Race "Course, containing in its upper story a magnificent mess room and ball room "for the serjeants of the cavalry regiment, and on the lower story, reading "rooms, recreation rooms, &c., &c., for the men of the corps, was handed over "for occupation in February last, and the block of barracks, up to that time "occupied by the Non-Commissioned Officers of the cavalry corps, was then "transferred to the Artillery."

*Bellary.*—There are no changes to mention in either Infantry or Artillery Barracks.

*Cannanore.*—The floors of the Infantry Barracks have been boarded, and all necessary repairs made in the roofs.

*Ramandroog.*—This small sanitarium is 38 miles from Bellary, and 3,150 feet above the level of the sea.

The barrack accommodation is reported to be in good sanitary condition.

*Hydrabad Circle.*—The 18th Hussars continue to occupy the old European Infantry Barracks at Secunderabad; and in consequence of the arrest of the new Cavalry Barracks beyond Trimulgherry, much has been done to improve the sanitary condition of these old buildings.

Walls and other buildings have been levelled to give more ventilation, latrines and urinals have been built, drainage improved and subsidiary buildings erected.

In reference to these old barracks, Deputy Inspector-General Cowen remarks: "In marked contrast with them stands the fine cantonment at "Trimulgherry, where, so far at least as barrack rooms and quarters are con-"cerned, the Royal Artillery and two Infantry regiments are palatially accom-"modated. At Trimulgherry two new blocks of barracks for the accommodation "of the Royal Horse Artillery were completed at the end of the year."

*Kamptee.*—The same Officer reports that, "The barracks here are objec-"tionable in site and faulty in construction. In addition to this, the men of the 20th Depôt, Royal Artillery, have been overcrowded, as mentioned in my inspection report, in consequence of their space being encroached on by coffee shops, recreation rooms, tailors' shops, &c., for which no separate buildings exist.

The Surgeon of the regiment of Infantry at Kamptee, while approving of the general construction of the barracks and of the accommodation which they afford, states, "To make the faulty position worse, the washhouses, urinals, "latrines, &c., &c., are placed to windward. The site is very low, and liable "to become swampy after heavy rains."

*Birmah Circle, Rangoon.*—The barracks here are made of teak, with shingle roofs, and ceiled throughout, and afford excellent and ample accommodation for the men and married families. The subsidiary buildings are complete and in good order.

*Thayetmyo.*—Here the Principal Medical Officer reports that, "the "barracks are new, admirably built of teak, raised 10 feet from the ground, "accommodation ample and ventilation sufficient. Notwithstanding this "satisfactory state of the buildings, I have thought it my duty to represent "that the site is unfavourable to health. For two successive years, cholera "has appeared in an epidemic form and of a most malignant type. The site "is low-lying and surrounded on all sides but one by elevated ground, covered

*Madras.* " with trees and dense jungle, and forms, as it were, a basin. The river " Irrawaddy subtends one side, and the water in the dry season recedes from " its banks, leaving an expanse of arid sand, from which great heat is re- " flected, &c., &c.

" An elevated site on the opposite or left bank of the river, cheerful, dry, " exposed to the prevailing winds, accessible by a good main road, free from " jungle, of a dry gravelly soil, and within a quarter of a mile of the river, " from the bank of which the water does not recede, has been suggested by me " as a far more eligible site ; at present it has been selected as a cholera camp, " and when occupied by the men of the 76th Regiment, for whom temporary bar- " racks were erected in September, it was pronounced eminently satisfactory."

*Tonghoo.*—Here the barracks are also of teak, and the accommodation for the troops is very good. The subsidiary buildings are stated to be in good repair and sufficient for all requirements.

*Port Blair.*—The barracks are placed on the southern ridge of Ross Island and consist of two buildings raised on posts, 3 and 6 feet respectively from the ground. The general construction is good and the ventilation ample.

Considering the low rate of mortality, and the mild character, as well as pausity, of the cases treated at Port Blair, that station continues to deserve its reputation of being a healthy one for British troops.

Hospitals. *Presidency Circle.*—The sick of the regiment and battery of Artillery quartered in Fort St. George are treated in the Military Division of the General Hospital, situated on the esplanade between the Fort and Coom river.

The accommodation is ample, and tolerably good, at any rate in the upper story.

The hospital accommodation at Poonamallee is of the same inferior description as that of the barrack, and is available for 45 sick.

*St. Thomas's Mount.*—The Artillery Hospital is a good flat-roofed double-storied building, and well raised from the ground, having two wards below and two above, capable of accommodating 10 patients each.

The ventilation of the upper wards is ample, but that of the lower is rather interfered with by the proximity of a high compound wall.

The female hospital is a new double-storied building, and the accommodation is very good.

The hospital accommodation at Wellington is ample for the men, but that for the sick women is inadequate, there being only room for six patients. This has been frequently represented.

*Mysore Circle.*—At Bangalore the hospital accommodation continues to merit the high character given of it in former reports.

There are but few changes to record during the year, beyond the opening in April of the Garrison Female Hospital. Deputy Inspector-General Barclay reports in reference to this building: " I consider it, in respect of position, " plan and construction, the best hospital that I have seen in India. The " accommodation is ample for all ordinary wants and most comfortable. Its " ventilation is excellent and the situation convenient for all the families, " except those of the Infantry."

At Bellary the sick have sufficient and good accommodation.

A large double-storied female hospital is in course of construction, and will afford, when complete, ample and excellent accommodation for the sick women and children.

At Cannanore, there are no changes or improvements to report.

The hospital at Ramandroog is a good one, and the accommodation is reported sufficient for the number of sick.

*Hyderabad Circle.*—No improvements have been made in the Cavalry Hospital at Secunderabad, but the drainage of the compound has lately been improved.

At Trimulgherry the sick of the Artillery have been accommodated in one of the double-storied barracks belonging to the Horse Artillery.

The hospital accommodation for the sick of the two Infantry Corps, also stationed at Trimulgherry, is favourably reported on.

The Artillery and Infantry hospitals at Kamptee are in good sanitary condition, and the accommodation sufficient for the number of sick.

*Burmah Circle.*—The permanent hospital accommodation at Rangoon and Port Blair is good and sufficient. *Madras.*

At Thayetmyo and Tongho barrack buildings are appropriated as hospitals. The accommodation is reported good.

*Lock Hospitals and the working of the Contagious Diseases Act.*—While there can be no question as to the advantages that have been obtained from these institutions since they were first established, yet it is in consequence of the inefficiency of the supervision exercised over prostitutes at military stations that the full measure of benefit, which lock hospitals are capable of conferring, has not been obtained.

The duties of registration and supervision are no doubt attended with many difficulties, and unless they are carried out in an effective manner, in other words, with inflexible honesty and determination, it is obvious that the humane object of the Contagious Diseases Act must be proportionately frustrated.

The total admissions during the year from the various forms of venereal disease, were 1,612, equal to 15·9 per cent. of admissions to strength, showing a decrease of admissions compared with the previous year of 2·5 per cent. But until I see a decrease of admissions at every station where registration and lock hospitals are in operation, I must come to the conclusion that the Act is at any rate imperfectly carried out at those stations where no decrease is shown.

*Presidency Circle.*—As a rule, the latrine system in Madras is far behind that of the Bengal and Bombay Presidencies, where all latrines and urinals are on the dry earth system. Latrines.

In the Madras Presidency, this great improvement in barrack latrines has as yet been only partially introduced.

At all stations where the dry earth system of conservancy is in operation and carried out in an efficient manner, it has given great satisfaction.

Poonamallee is the only station in the Presidency Circle where the dry earth system of conservancy has not been introduced.

*Mysore Circle.*—Deputy Inspector-General Barclay reports: "The new "latrines at Bellary, mentioned in last year's report as being under construc- "tion, are still incomplete, and until they are handed over, the dry earth "system cannot be introduced there.

"Nothing has been done at any other station in the Circle to adopt the "latrines for that system. It is nominally carried out in those of the Infantry "at Bangalore."

At Cannanore the latrines are still on the old system, objectionably situated, and often offensive.

If the dry earth system were introduced at that damp station, the earth would require to be dried artificially during the rainy season.

At Ramandroog the improved system of latrines has been sanctioned, and the operations for adapting the old privies to that system are in progress.

*Hydrabad Circle.*—The dry earth system of conservancy is only partially in operation at Secunderabad. At Kamptee it is reported that the improved system of conservancy has been introduced, but not strictly carried out, owing to the difficulty experienced in getting the men to conform to it in every particular.

*Burmah Circle.*—At Rangoon and Tonghoo the dry earth system is well carried out. At Theyetmyo it has not yet been introduced.

*Presidency Circle.*—The troops stationed at Fort St. George have the use of a large plunge bath, several smaller baths, lavatories and enamelled basins. Baths and Lavatories.

At St. Thomas's Mount the ablutionary conveniencies are sufficient, and there are three plunge baths. Water supply is sometimes scanty in long continued dry weather.

Poonamallee has a good plunge bath and sufficient lavatory accommodation.

Wellington Depôt is sufficiently provided with ablution rooms and swimming bath.

*Mysore Circle.*—The Deputy Inspector-General reports: "There have been "no changes beyond necessary repairs in any of them in the Circle during the "year. But the partial completion of the waterworks at Bangalore has

*Madras.* "enabled the plunge baths on the Racecourse to be taken into use for the "Cavalry and Artillery, but the plunge baths for Infantry are still without "water."

At Cannanore tubs are supplied for ablutionary purposes, and means for performing these operations with privacy have lately been added. But plunge baths have not yet been provided at this station.

At Bellary there are good bath and ablution rooms in rear of each barrack, and at the distance of about half a mile there is an excellent plunge bath. But at this station the supply of water is sometimes scanty.

At Ramandroog the means of securing personal cleanliness are sufficient.

*Hydrabad Circle.*—At Secunderadad the bath and ablution accommodation is reported sufficient, and the plunge bath is used freely in hot weather. There are no regular bathing parades, nor are they required.

At Kamptee the bath and lavatory accommodation is ample, and in addition thereto there is a good swimming bath.

*Burmah Circle.*—The bath and ablution accommodation at Rangoon is sufficient, and the soldiers resort to "the Lake" for the purpose of swimming.

Conveniences for the same purpose are reported to be sufficient at Thayetmyo, Tonghoo, and Port Blair.

Water Supply. *Presidency Circle.*—At Fort St. George water of good quality is supplied from wells at a distance. A scheme for supplying water on a large scale at the Presidency town is now being carried out, and the pipes are about to be laid.

Water of excellent quality and in great abundance will be brought from a lake eight or nine miles from Madras. When completed this will be a very important sanitary measure.

At St. Thomas's Mount water is obtained from wells of good quality, but it is not very abundant at certain seasons.

At Poonamallee the supply from wells is abundant and of good quality.

At Trichinopoly, ditto.

Wellington: water is plentiful here from running streams, and protected from all sources of pollution.

*Mysore Circle.*—Deputy Inspector-General Barclay reports that, "The "supply of drinking water for the troops at Bangalore continues to be pro- "cured from the 'Dholue's Wells.' An engine and the requisite machinery "for pumping up the water from the wells to the several barracks have long "been erected, but no pipes have yet been laid."

The water therefore continues to be brought to barracks by Puckaulies as heretofore.

The water from wells at Bellary is good, but the supply is sometimes scanty.

At Ramandroog water of excellent quality is obtained from springs on the side of the hill.

*Hydrabad Circle.*—At Secunderabad, the Surgeon of the 18th Hussars, reports: "The large experimental well, about 1,000 yards from the barracks, "was completed in April last, but the water is unfit for drinking purposes, "owing to the quantity of chunam contained in it. The supply is therefore "still kept up by watercarts from the well in the Sapper lines, which is of "good quality."

At Trimulgherry water is obtained from wells in the vicinity of the barracks, some of which yield good water, whilst others are unfavourably reported on. In the latter, the water is liable, it is alleged, to be contaminated from want of any system of drainage in the cantonment.

At Kamptee water is obtained from wells in the vicinity of the barracks. The quality of the water is good and the supply plentiful, except in the hot season, when water for ablutionary purposes has to be brought from the river Kanhan.

*Birmah Circle.*—Except at Port Blair the supply of water at all the stations in Burmah, is entirely from wells close to the barracks. At Port Blair it is collected in reservoirs, partly from rain-fall and partly from springs. Here, as also at Rangoon, the supply is somewhat scanty in March and April. The usual method of filtration in this country is alway adopted.

*Presidency Circle.*—Satisfactory reports are made of the state of the drainage at all the stations in the Presidency Circle. The only exception being the large drain at the N.E. angle of Fort St. George, which is often offensive. *Madras.* Drainage.

*Mysore Circle.*—There has been no change of any kind in the drainage of the several stations during the year. Their condition has been carefully attended to, and no complaints have been made.

*Hydrabad Circle.*—The defective drainage of the hospital compound at Secunderabad, which has often formed the subject of complaint, has lately been much improved, and "when the proposed drainage and other improve-"ments in the vicinity of the barracks are carried out, most local causes of "insanitation will be removed as far as the site will allow."

At Trimulgherry no system of drainage has yet been adopted. On this subject the Surgeon of the Artillery remarks: "Drainage, or rather the "want of drainage, has been made the subject of many special reports to "Government, and it has been ordered, I believe, to be carried out with local "funds.

"There are no drains or dug-out water-courses, everything depending on "the natural formation and slope of the ground.

"The ground all round the barracks is irregular, and covered here and "there with boulders, so that dirt of all kinds is apt to be hidden till washed "out by the rain. It is probably owing to this want of drainage that so many "cases of typhoid fever have occurred of late years at Trimulgherry."

At Kamptee no complaints have been made on the subject of drainage during the year under report.

*Birmah Circle.*—At Rangoon the drainage is good, the site of the barracks is elevated and the drains are chiefly of brick. At Thayetmyo the drainage is purely surface, and this is assisted by the natural fall of the river.

At Tonghoo the drainage has frequently been reported as defective, and plans have been submitted for the construction of good brick drains, which when carried out will render the barracks very complete.

*Presidency Circle.*—The meat ration, beef five days and mutton two days in the week, is generally of pretty fair quality, but until the system of stall feeding slaughter animals is adopted, meat of a really good quality will never be provided for the troops in this country. Rations.

The only change in the rations is the authorized issue of dholl in lieu of a certain quantity of green vegetables at the season when the latter are scarce.

Want of variety in the vegetable ration is a source of complaint at almost every station. Bread of good quality is supplied from the Government bakery to the troops at Madras.

*Mysore Circle.*—There is nothing special to report upon the rations issued to the troops in this Circle. They have been generally good, with the exception of the bread at Bangalore (from Government bakery) which has often been complained of, on account of being of inferior quality. At the other stations bread has been good.

*Hydrabad Circle.*—In this circle of medical superintendence the rations appear to have given satisfaction generally. Here, as elsewhere, complaints are made of the vegetable ration being poor and but little varied.

Bread of fair quality is supplied by private contract at Secunderabad and Kamptee, there being no Government bakery at either station.

*Birmah Circle.*—On the subject of rations, the Principal Medical Officer reports, "that the rations are on the whole satisfactory. Beef forms the "almost invariable meat ration, as sheep thrive so badly in Birmah.

The meat is of good quality, but varies somewhat according to the season of the year. At Tonghoo the beef is especially good. Mutton is issued at frontier stations to the hospitals twice a week, and at Rangoon every alternate day.

Salt meat is issued twice monthly, and at Port Blair, fresh pork, the pigs being fed by the Commissariat, is issued twice a week.

The bread throughout is sound and wholesome. Vegetables are everywhere scarce.

*Presidency, Mysore, Hydrabad, and Birmah Circles.*—This is always done by native cooks and with Indian utensils. This system is, I think, preferred Cooking.

*Madras.* by soldiers to the home arrangement of cooking the rations together, and all in the same way.

In India soldiers can get their rations cooked very much according to their individual tastes without difficulty or inconvenience.

"Duff's cooking ranges," though sanctioned by Government, are still in abeyance, until the question of fuel necessary for them has been finally decided.

Canteens. *Presidency, Mysore, Hydrabad, and Birmah Circles.*—No changes have been introduced into the canteen system during the year.

The liquors supplied have given satisfaction.

It has been suggested, and no doubt the suggestion is a good one, that if sound light wines could be sold within the means of the soldier, it would be well to interdict the sale of spirits in canteens, except on special occasions.

Clothing. The Artillery and Infantry wear white drill in the hot season, and serge on all night duties, and the latter likewise in the cold and rainy seasons. The serge frock recently issued to the Artillery has given great satisfaction to that arm of the Service.

The clothing of the Cavalry continues as heretofore, viz., white drill in the hot, and cloth in the cold season. A serge frock would also be very suitable for the mounted branch of the Service.

Bedding. There has been no change in the articles composing barrack bedding during the year.

All executive officers recommend that pillows should be issued by Government to soldiers in barracks as they are to sick in hospital. I quite endorse this recommendation.

Duties. From none of the medical reports of corps does it appear that the duties have been unnecessarily severe, or have involved undue exposure.

At the same time, it must be admitted that night duties, involving as they do want of rest and exposure to malarious influences in tropical climates, should be made as light as possible. There can be no question but night duties are often productive of disease, and, still more, of that premature decay which is so remarkable a characteristic of the middle-aged soldiers.

Employment, Amusements, Gymnastics. Workshops and gardening form the chief employments for soldiers in this command, and no doubt they are beneficial as far as they go, but for obvious reasons, comparatively few men can be so employed.

Workshops are encouraged in every regiment, and much excellent work is done in them. It has been suggested, and I think on good grounds, that the general usefulness of workshops might be greatly extended, if they were made schools of instruction more than they are at present for the large number of soldiers who have not learnt any trade before entering the Service.

At some stations gardening is the favourite occupation, and is systematically carried on.

Gardening affords healthy employment to a limited number of men, and amusement to many more. Soldiers have not been employed on road-making in any part of this Presidency.

Cricket is the favourite out-door game, though many other games are played, such as quoits, fives, skittles, bowling, athletic sports, *&c.*, *&c.*

In-door amusements include recreation rooms, theatres, *&c.*

Gymnasia, more or less complete, are now established at many military stations in this Presidency, and gymnastics are systematically practised.

There can be no doubt of the improvement which gymnasia are calculated to effect in the physical powers, more especially of young soldiers.

Intemperance. The new statistical nomenclature does not contain a distinct designation for admissions from intemperance, unless they assume the gravity of delirium tremens or alcoholic poisoning; the prevalence therefore of intemperance can only be ascertained approximately by the number of admissions from febricula, dyspepsia, delirium tremens and alcoholic poisoning.

Under these circumstances it is impossible to ascertain statistically whether intemperance is increasing or decreasing in the Service, or the exact number of admissions into hospital, which directly or indirectly result from too free indulgence in liquor.

*Madras.*

Under the head of delirium tremens there were 87 admissions and 3 deaths during the year, and 24 admissions appear under the head of "alcohol." These figures show a considerable decrease of the graver forms of intemperance compared with the preceding year. In 1869 the admissions from delirium tremens were 117, and 10 died; from alcohol, admissions 159, and 1 died.

On the subject of intemperance, the officer in medical charge of the 18th Hussars remarks, "During the year there were 98 fines inflicted on "92 men of the regiment for intemperance.

"The amount of the fines was 32*l.* 2*s.* 6*d.* I cannot speak too highly of "this system, it is without doubt the best devised for the prevention of "drunkenness."

On the other hand, the Surgeon of the 45th Regiment, stationed at Fort St. George, reports "that the system of 'fines' is wholly inoperative as a "means of diminishing intemperance at the Presidency."

In the course of this report I have made special mention of all changes and improvements that have been made bearing upon the health and comfort of the troops during the year; but, as will be observed, there have been but few to note, for though many improvements are in contemplation, the deficiency of funds has for a considerable time back crippled the operation of the Government, and prevented any outlay excepting for the most indispensable purposes.

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## III.—Bombay.

*Bombay.*

The average strength of the European force in the Bombay Command throughout the year was 10,557; the admissions into hospital from it were 16,220, and the deaths 198, including 28 among invalids on their passage home and at Netley. These numbers give 1,536 admissions and 18·73 deaths per 1,000 of mean strength; the former closely corresponding with, and the latter 3·86 per 1,000 under, the ratios of the preceding year, which differed very slightly from the average of the last ten years.

The following Table, framed from Abstract No. 20 in the Appendix, shows the influence of the different classes of diseases in causing sickness and mortality:—

*Bombay.*

| Order. | Diseases. | Strength, 10,557. Admissions. | Deaths. In India. | Deaths. Of Invalids. | Deaths. Total. | Ratio per 1,000 of Mean Strength. 1870. Admitted. | 1870. Died. | 1869. Admitted. | 1869. Died. |
|---|---|---|---|---|---|---|---|---|---|
| | I. *General Diseases.* | | | | | | | | |
| 1 | Febrile Group .. | 7,872 | 56 | .. | 56 | 745·7 | 5·30 | 688·6 | 8·35 |
| 2 | Constitutional „ .. | 1,722 | 22 | 13 | 35 | 163·1 | 3·31 | 169·0 | 2·09 |
| | II. *Local Diseases.* | | | | | | | | |
| | Diseases of the— | | | | | | | | |
| 1 | Nervous System .. | 165 | 22 | 2 | 24 | 15·6 | 2·27 | 22·1 | 3·01 |
| 2 | Eye .. .. .. | 224 | .. | .. | .. | 21·2 | .. | 37·7 | .. |
| 3 | Ear .. .. .. | 72 | .. | .. | .. | 6·8 | .. | 6·0 | .. |
| 4 | Nose .. .. .. | 3 | .. | .. | .. | ·3 | .. | ·7 | .. |
| 5 | Circulatory System .. | 158 | 9 | 2 | 11 | 15·0 | 1·04 | 15·2 | 1·14 |
| 6 | Absorbent „ .. | 226 | .. | .. | .. | 21·3 | .. | 22·8 | .. |
| 8 | Respiratory „ .. | 505 | 8 | .. | 8 | 47·8 | ·75 | 47·7 | 1·14 |
| 9 | Digestive „ .. | 2,275 | 37 | 10 | 47 | 215·5 | 4·45 | 229·6 | 3·70 |
| 10 | Urinary „ .. | 876 | 1 | .. | 1 | 83·0 | ·09 | 70·1 | ·47 |
| 11 | Generative „ .. | 144 | .. | .. | .. | 13·7 | .. | 11·8 | .. |
| 12 | Organs of Locomotion.. | 43 | 1 | 1 | 2 | 4·1 | ·19 | 3·5 | .. |
| 13 | Cellular Tissue.. .. | 178 | .. | .. | .. | 16·9 | .. | 18·6 | .. |
| 14 | Cutaneous System .. | 750 | .. | .. | .. | 71·0 | .. | 74·0 | ·10 |
| | III. *Conditions, &c.* | | | | | | | | |
| | Debility.. .. .. | 122 | .. | .. | .. | 11·5 | .. | 9·5 | .. |
| | IV. *Poisons* .. | 120 | 4 | .. | 4 | 11·4 | ·38 | 12·6 | ·47 |
| | V. *Injuries.* | | | | | | | | |
| 2 | Accidental .. .. | 758 | 8 | .. | 8 | 71·8 | ·76 | 87·1 | ·66 |
| 3 | Homicidal .. .. | 1 | .. | .. | .. | } ·4 | ·19 | { ·4 | ·10 |
| 4 | Self-inflicted .. .. | 3 | 2 | .. | 2 | | | { ·1 | 1·04 |
| 6 | Judicial.. .. .. | .. | .. | .. | .. | .. | .. | .. | ·10 |
| | VI. *Surgical Operations* | | .. | .. | .. | ·1 | .. | ·2 | .. |
| | No Appreciable Disease | 2 | .. | .. | .. | ·2 | .. | ·1 | .. |
| | Total .. | 16,220 | 170 | 28 | 198 | 1536·4 | 18·73 | 1527·4 | 22·40 |
| | Average of 10 years, 1860-9 .. | .. | .. | .. | .. | 1521·4 | 22·58 | .. | .. |

General Diseases were more prevalent but less fatal than in 1869. The increase in the admissions and the reduction in the mortality both occurred in the febrile group.

The following Table shows the admissions and deaths by the principal diseases comprised in this class :—

| General Diseases. | Admitted. | Died. | Ratio per 1,000 of Strength. 1870. Admitted. | 1870. Died. | 1869. Admitted. | 1869. Died. |
|---|---|---|---|---|---|---|
| *Febrile—* | | | | | | |
| Eruptive Fevers .. .. .. | 4 | .. | ·4 | .. | 2·0 | ·10 |
| Continued „ .. .. .. | 1,481 | 25 | 140·3 | 2·37 | 135·5 | 1·32 |
| Paroxysmal „ .. .. .. | 6,358 | 30 | 602·2 | 2·84 | 539·9 | 1·51 |
| Malignant Cholera.. .. .. | 1 | 1 | ·1 | ·09 | 7·7 | 5·22 |
| Choleraic Diarrhœa .. .. | .. | .. | .. | .. | ·9 | ·10 |
| Influenza .. .. .. .. | 3 | .. | ·3 | .. | 1·7 | .. |
| Erysipelas .. .. .. .. | 15 | .. | 1·4 | .. | ·6 | .. |
| Other Diseases of this group | 10 | .. | ·9 | .. | ·3 | ·10 |
| *Constitutional—* | | | | | | |
| Rheumatism. .. .. .. | 415 | .. | 39·3 | .. | 42·4 | ·19 |
| Syphilis .. .. .. .. | 1,011 | 2 | 95·8 | ·19 | 99·9 | ·29 |
| Scrofula, Phthisis, &c. .. .. | 114 | 31 | 10·8 | 2·94 | 12·3 | 1·61 |
| Scurvy and Purpura .. .. | 5 | .. | ·5 | .. | 1·4 | .. |
| Anæmia .. .. .. .. | 164 | .. | 15·5 | .. | 12·2 | .. |
| Other Diseases of this group .. | 13 | 2 | 1·2 | ·19 | ·7 | .. |

Only four cases of *eruptive fevers* occurred among the troops throughout the whole Command during the year, they were one of small-pox, one of chicken-pox, and two of scarlet fever. *Continued fevers* were slightly more prevalent, but the proportion of admissions by *paroxysmal fevers* was one-fifth higher than in the preceding year. The mortality by both continued and paroxysmal fevers also shows an increase.

There was a marked exemption from *malignant cholera*; only one case, which, however, proved fatal, having occurred among troops on the march.

There was a slight decrease in all the principal diseases of the constitutional group, except *anæmia*, which was 3·3 per 1,000 higher than in 1869, a result probably of the greater amount of paroxysmal fevers.

Local Diseases.—Compared with the preceding year there has been a decline in the admissions by diseases of the nervous system, the eye, and the digestive system, and an increase in diseases of the urinary system, chiefly in cases of gonorrhœa. There was an increase in the mortality by diseases of the digestive system, chiefly in hepatitis, and a decrease in all the other classes.

The class of Poisons gave a slightly lower ratio of admissions than in 1869. It comprised 79 admissions and 4 deaths by *delirium tremens*, 40 by alcoholic poisoning, and one the bite of a scorpion. Of the Accidental Deaths, 6 were the result of drowning, 1 of concussion of the brain, and 1 of asphyxia when drunk. There were only 2 suicidal deaths, both by cut throat, and one surgical operation—amputation at lower third of thigh.

The admissions and deaths at each of the principal stations in the Command were as follows:—

*Bombay.*

| Military Divisions. | Stations. | Average Annual Strength. | Admitted into Hospital. | Died in India. | Ratio per 1,000. | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Admitted. | Died. | Average of 7 Years. | |
| | | | | | | | Admitted. | Died. |
| Presidency .. | Colaba .. .. | 376 | 744 | 7 | 1978·7 | 18·62 | 1333·7 | 17·71 |
| Poona .. | Poona.. .. .. | 1,825 | 1,834 | 33 | 1004·9 | 18·08 | 1301·7 | 12·85 |
| | Sattara. .. .. | 194 | 196 | 2 | 1010·3 | 10·33 | 1085·3 | 9·39 |
| | Ahmednuggur .. | 581 | 486 | 4 | 836·5 | 6·88 | 1490·5 | 12·64 |
| | Asseerghur . .. | 68 | 124 | .. | 1823·6 | .. | 1304·6 | 18·73 |
| | Belgaum .. .. | 949 | 865 | 9 | 911·5 | 9·48 | 1140·9 | 10·95 |
| | Kirkee . .. .. | 501 | 637 | 2 | 1271·5 | 3·99 | 1460·2 | 12·53 |
| Mhow .. | Mhow . .. .. | 1,302 | 2,787 | 15 | 2140·6 | 11·52 | 1654·1 | 15·10 |
| | Indore . .. .. | 86 | 154 | .. | 1790·7 | .. | 1619·3 | 13·60 |
| | Neemuch .. .. | 337 | 947 | 8 | 2810·1 | 23·74 | 2469·0 | 44·41 |
| | Nusscerabad .. | 684 | 1,774 | 25 | 2593·6 | 36·55 | 1876·7 | 34·43 |
| Northern.. | Deesa.. .. .. | 578 | 544 | 7 | 941·2 | 12·11 | 1257·6 | 13·85 |
| | Ahmedabad. .. | 239 | 714 | 9 | 2987·5 | 37·66 | 1844·0 | 18·05 |
| | Mount Aboo .. | 87 | 174 | 3 | 2000·0 | 34·48 | 1421·2 | 14·84 |
| Scinde .. | Kurrachee.. .. | 622 | 1,409 | 10 | 2265·3 | 16·08 | 1397·9 | 13·92 |
| | Hydrabad .. .. | 357 | 485 | 4 | 1358·6 | 11·21 | 1191·7 | 14·08 |
| | Aden .. .. .. | 651 | 785 | 9 | 1205·8 | 13·83 | 1034·4 | 22·82 |
| | Deolalee Depôt .. | 327 | 1,061 | 11 | 3244·6 | 33·64 | .. | .. |
| | Sanitaria & Invalids .. | 17 | 31 | 3 | .. | .. | .. | .. |
| | On the March, &c. | 474 | 406 | 8 | 856·5 | 16·88 | 1076·7 | 28·07 |

Sholapore is omitted from this Table, having been occupied only during the first five weeks of the year.

Compared with the results for 1869 this Table shows a decrease in the admissions at Poona, Ahmednuggur, Belgaum, Deesa, and Kurrachee; it was most marked at Kurrachee, where, however, the admissions in 1869 had been very greatly in excess of the average. At all the other stations there was an increase in the ratio, most marked at Colaba, Ahmedabad, and Neemuch, and very considerable also at Asseerghur, Mhow, and Mount Aboo. There was no corresponding augmentation in the mortality, which was lower than in the preceding year at all the stations, except Colaba, Poona, Ahmedabad, and Mount Aboo. Compared with the average of the preceding seven years, there was a considerable excess in the admissions at Colaba, Asseerghur, Mhow, Neemuch, Nusseerabad, Ahmedabad, Mount Aboo, and Kurrachee, and in the deaths at Poona, Ahmedabad, and Mount Aboo.

The following Tables show the influence of the different classes of diseases, in causing sickness and mortality, in each of the military divisions in the Command:—

| Order. | Military Divisions ... | Presidency. | | Poona. | | Mhow. | | Northern. | | Scinde. | | Aden. | | Deolalee. | | Troops on March | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Annual Strength ... ... | 376 | | 4,130 | | 2,469 | | 904 | | 979 | | 651 | | 327 | | 474 | |
| | Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| | *I. General Diseases.* | | | | | | | | | | | | | | | | |
| 1 | Febrile Group... | 344 | 2 | 1544 | 12 | 3447 | 18 | 517 | 10 | 857 | 7 | 368 | 1 | 674 | 2 | 169 | 2 |
| 2 | Constitutional ,, ... | 61 | 2 | 558 | 10 | 448 | 4 | 243 | ... | 139 | 1 | 60 | ... | 62 | 3 | 54 | 2 |
| | *II. Local Diseases.* Diseases of the— | | | | | | | | | | | | | | | | |
| 1 | Nervous System ... | 2 | ... | 40 | 4 | 56 | 6 | 14 | 4 | 27 | 2 | 12 | 3 | 10 | 1 | 5 | 2 |
| 2 | Eye ... ... ... | 7 | ... | 73 | ... | 59 | ... | 33 | ... | 22 | .. | 18 | ... | 10 | ... | 5 | ... |
| 3 | Ear ... ... ... | 4 | ... | 18 | ... | 13 | ... | 8 | ... | 24 | ... | 3 | ... | 4 | ... | ... | ... |
| 4 | Nose ... ... ... | ... | ... | 2 | ... | 1 | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... |
| 5 | Circulatory System . | 2 | ... | 43 | 3 | 51 | 3 | 5 | ... | 24 | ... | 9 | 1 | ... | 1 | 7 | 1 |
| 6 | Absorbent ,, ... | 9 | ... | 85 | ... | 84 | ... | 28 | ... | 12 | ... | 4 | ... | 2 | ... | 6 | ... |
| 8 | Respiratory ,, ... | 36 | ... | 164 | 5 | 121 | 1 | 33 | ... | 83 | ... | 33 | ... | 9 | 1 | 15 | 1 |
| 9 | Digestive ,, ... | 147 | 3 | 663 | 10 | 531 | 12 | 220 | 2 | 371 | 3 | 106 | 3 | 157 | 2 | 74 | ... |
| 10 | Urinary ,, ... | 40 | ... | 319 | ... | 273 | ... | 120 | ... | 72 | 1 | 35 | .. | 27 | ... | 23 | ... |
| 11 | Generative ,, ... | 7 | ... | 62 | ... | 27 | .. | 21 | ... | 12 | ... | 10 | ... | 5 | ... | 5 | ... |
| 12 | Organs of Locomotion | 1 | ... | 16 | ... | 16 | 1 | 3 | ... | ... | ... | 2 | ... | 6 | ... | 1 | ... |
| 13 | Cellular Tissue ... | 7 | ... | 51 | ... | 39 | ... | 24 | ... | 24 | ... | 9 | ... | 5 | ... | 3 | ... |
| 14 | Cutaneous system ... | 34 | ... | 237 | ... | 237 | ... | 55 | ... | 87 | ... | 59 | ... | 43 | ... | 12 | ... |
| | *III. Conditions, &c.* | | | | | | | | | | | | | | | | |
| | Debility ... ... | 3 | ... | 4 | ... | 43 | ... | 18 | ... | 30 | ... | 6 | ... | 2 | ... | 2 | ... |
| | *IV. Poisons* ... | 3 | ... | 57 | 1 | 29 | 2 | 14 | 1 | 7 | ... | 4 | ... | 6 | ... | 5 | ... |
| | *V. Injuries.* | | | | | | | | | | | | | | | | |
| 2 | Accidental ... ... | 36 | ... | 280 | 3 | 181 | 1 | 76 | 2 | 101 | ... | 42 | 1 | 38 | 1 | 20 | ... |
| 3 | Homicidal ... ... | ... | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 4 | Self-inflicted... ... | 1 | ... | 3 | 2 | 1 | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... |
| | *VI. Surgical Operations* | ... | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| | No appreciable disease ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1 | ... | ... | ... |
| | Total ... ... | 744 | 7 | 4220 | 50 | 5662 | 48 | 1432 | 19 | 1894 | 14 | 785 | 9 | 1061 | 11 | 406 | 8 |

| Order. | Military Divisions ... | Presidency. | | Poona. | | Mhow. | | Northern. | | Scinde. | | Aden. | | Deolalee. | | Troops on March. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Annual Strength ... ... | Annual Ratio per 1,000 of Mean Strength. | | | | | | | | | | | | | | | |
| | Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| | *I. General Diseases.* | | | | | | | | | | | | | | | | |
| 1 | Febrile Group... | 914·9 | 5·32 | 373·9 | 2·91 | 1430·9 | 7·47 | 571·9 | 11·06 | 875·4 | 7·15 | 565·3 | 1·54 | 2061·2 | 6·11 | 356·5 | 4·22 |
| 2 | Constitutional ,, ... | 162·3 | 5·32 | 135·1 | 2·42 | 186·0 | 1·66 | 268·8 | ... | 142·0 | 1·02 | 92·2 | ... | 189·6 | 9·17 | 113·9 | 4·22 |
| | *II. Local Diseases.* Diseases of the— | | | | | | | | | | | | | | | | |
| 1 | Nervous System ... | 5·3 | ... | 9·7 | ·97 | 23·3 | 2·49 | 15·5 | 4·43 | 27·6 | 2·04 | 18·5 | 4·60 | 30·6 | 3·06 | 10·6 | 4·22 |
| 2 | Eye ... ... ... | 18·6 | ... | 17·7 | ... | 24·5 | ... | 36·5 | ... | 22·5 | ... | 27·6 | ... | 30·6 | ... | 10·6 | ... |
| 3 | Ear ... ... ... | 10·6 | ... | 4·4 | ... | 5·4 | ... | 8·9 | ... | 24·5 | ... | 4·6 | ... | 12·2 | ... | ... | ... |
| 4 | Nose ... ... ... | ... | ... | ·5 | ... | ·4 | ... | ... | ... | 1·0 | ... | ... | ... | ... | ... | ... | ... |
| 5 | Circulatory System . | 5·3 | ... | 10·4 | ·73 | 21·2 | 1·24 | 5·5 | ... | 24·5 | ... | 13·8 | 1·54 | ... | 3·06 | 14·8 | 2·11 |
| 6 | Absorbent ,, ... | 23·9 | ... | 20·6 | ... | 24·9 | ... | 31·0 | ... | 12·3 | ... | 6·1 | ... | 6·1 | ... | 12·6 | ... |
| 8 | Respiratory ,, ... | 95·7 | ... | 39·7 | 1·21 | 50·2 | ·42 | 36·5 | ... | 84·8 | ... | 58·4 | ... | 27·5 | 3·06 | 31·6 | 2·11 |
| 9 | Digestive ,, ... | 391·0 | 7·98 | 160·5 | 2·42 | 220·4 | 4·98 | 243·4 | 2·21 | 379·0 | 3·07 | 162·3 | 4·60 | 480·1 | 6·11 | 156·1 | ... |
| 10 | Urinary ,, ... | 106·4 | ... | 77·2 | ... | 113·3 | ... | 132·7 | ... | 73·5 | 1·02 | 53·8 | ... | 82·6 | ... | 48·5 | ... |
| 11 | Generative ,, ... | 18·6 | ... | 15·0 | ... | 11·2 | ... | 23·2 | ... | 12·3 | ... | 15·4 | ... | 15·3 | ... | 10·6 | ... |
| 12 | Organs of Locomotion | 2·7 | ... | 3·9 | ... | 6·6 | ·42 | 3·3 | ... | ... | ... | 3·1 | ... | 18·3 | ... | 2·1 | ... |
| 13 | Cellular Tissue ... | 18·6 | ... | 12·3 | ... | 16·2 | ... | 26·6 | ... | 24·5 | ... | 13·8 | ... | 15·3 | ... | 6·3 | ... |
| 14 | Cutaneous system ... | 90·4 | ... | 57·4 | ... | 98·4 | ... | 60·8 | ... | 88·8 | ... | 90·6 | ... | 131·5 | ... | 25·3 | ... |
| | *III. Conditions, &c.* | | | | | | | | | | | | | | | | |
| | Debility ... ... | 8·0 | ... | 1·0 | ... | 17·9 | ... | 19·9 | ... | 30·6 | ... | 9·2 | ... | 6·1 | ... | 4·2 | ... |
| | *IV. Poisons* ... | 8·0 | ... | 13·8 | ·24 | 12·0 | ·83 | 15·5 | 1·11 | 7·1 | ... | 6·1 | ... | 18·3 | ... | 10·6 | ... |
| | *V. Injuries.* | | | | | | | | | | | | | | | | |
| 2 | Accidental ... ... | 95·7 | ... | 67·8 | ·73 | 76·4 | ·42 | 84·1 | 2·21 | 103·2 | ... | 64·5 | 1·54 | 116·2 | 3·06 | 42·2 | ... |
| 3 | Homicidal ... ... | ... | ... | ... | ... | ·4 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 4 | Self-inflicted... ... | 2·7 | ... | ·7 | ·48 | ·4 | ... | ... | ... | 1·0 | ... | ... | ... | ... | ... | ... | ... |
| | *VI. Surgical Operations* | ... | ... | ... | ... | ·4 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| | No appreciable disease ... | ... | ... | 2 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 3·1 | ... | ... | ... |
| | Total ... ... | 1978·7 | 18·62 | 1021·8 | 12·11 | 2350·4 | 19 93 | 1584·1 | 21·02 | 1934·6 | 14·30 | 1205·8 | 13·82 | 3244·6 | 33·63 | 856·5 | 16·88 |

| Military Divisions ... | Presidency. | | Poona. | | Mhow. | | Northern. | | Scinde. | | Aden. | | Deolalee. | | Troops on the March. | | Presidency. | | Poona. | | Mhow. | | Northern. | | Scinde. | | Aden. | | Deolalee. | | Troops on the March. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average Annual Strength... ... | 376 | | 4,130 | | 2,409 | | 904 | | 979 | | 651 | | 327 | | 474 | | Annual Ratio per 1,000 of Mean Strength. | | | | | | | | | | | | | | | |
| General Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| *Febrile—* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Eruptive Fevers ... | ... | ... | ... | ... | 1 | ... | ... | ... | 2 | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ·4 | ... | ... | ... | 2·1 | ... | 1·6 | ... | ... | ... | ... | ... |
| Continued ,, ... | 5 | ... | 621 | 7 | 453 | 7 | 97 | 2 | 214 | 6 | 16 | ... | 60 | 1 | 27 | ... | 13·3 | ... | 150·3 | 1·70 | 188·0 | 2·30 | 107·3 | 2·21 | 218·6 | 6·13 | 24·5 | ... | 183·5 | 3·06 | 57·0 | ... |
| Paroxysmal Fevers ... | 336 | 2 | 918 | 5 | 2089 | 11 | 418 | 8 | 634 | 1 | 350 | 1 | 606 | 1 | 140 | 1 | 893·6 | 5·32 | 222·3 | 1·21 | 1240·8 | 4·57 | 462·4 | 8·85 | 647·6 | 1·92 | 537·6 | 1·54 | 1853·2 | 3·06 | 295·3 | 2·11 |
| Malignant Cholera ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 2·11 |
| Influenza ... ... | ... | ... | 1 | ... | 1 | .. | ... | ... | ... | .. | ... | ... | ... | ... | ... | ... | ... | ... | ·3 | ... | ·4 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Erysipelas ... ... | 1 | ... | 1 | ... | 3 | ... | 2 | ... | 1 | ... | 1 | ... | 8 | ... | 1 | ... | 2·7 | ... | ·3 | ... | 1·3 | ... | 2·2 | ... | 1·0 | ... | 1·6 | ... | 24·5 | ... | 2·1 | ... |
| Other Diseases ... | 2 | ... | 3 | ... | ... | ... | ... | ... | 6 | ... | ... | ... | ... | ... | 1 | ... | 5·3 | ... | ·7 | ... | ... | ... | ... | ... | 6·1 | ... | ... | ... | ... | ... | 2·1 | ... |
| *Constitutional—* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rheumatism ... ... | 11 | ... | 108 | ... | 137 | ... | 62 | ... | 36 | ... | 23 | ... | 19 | ... | 6 | ... | 29·2 | ... | 26·1 | ... | 56·9 | ... | 68·6 | ... | 36·8 | ... | 35·3 | ... | 58·1 | ... | 12·7 | ... |
| Syphilis ... ... | 43 | ... | 355 | 1 | 264 | 1 | 161 | ... | 74 | ... | 29 | ... | 27 | ... | 45 | ... | 114·4 | ... | 86·0 | ·24 | 109·6 | ·42 | 178·1 | ... | 75·6 | ... | 44·6 | ... | 82·6 | ... | 94·9 | ... |
| Scrofula, Phthisis, &c. | 1 | 2 | 40 | 8 | 24 | 3 | 5 | ... | 8 | 1 | 4 | ... | 9 | 3 | ... | 1 | 2·7 | 5·32 | 9·7 | 1·94 | 10·0 | 1·24 | 5·5 | ... | 8·2 | 1·02 | 6·1 | ... | 27·5 | 9·17 | ... | 2·11 |
| Scurvy and Purpura | 1 | ... | ... | ... | 1 | ... | 1 | ... | ... | ... | 2 | ... | ... | ... | ... | ... | 2·7 | ... | ... | ... | ·4 | ... | 1·1 | ... | ... | ... | 3·1 | ... | ... | ... | ... | ... |
| Anæmia ... ... | 4 | ... | 50 | ... | 21 | ... | 10 | ... | 21 | ... | 2 | ... | 5 | ... | 3 | ... | 10·6 | ... | 12·1 | ... | 8·7 | ... | 11·1 | ... | 21·4 | ... | 3·1 | ... | 15·3 | ... | 6·3 | ... |
| Other Diseases ... | 1 | ... | 5 | 1 | 1 | ... | ·4 | ... | ... | ... | ... | ... | 2 | ... | ... | 1 | 2·7 | ... | 1·2 | ·24 | ·4 | ... | 4·4 | ... | ... | ... | ... | ... | 6·1 | ... | ... | 2·11 |

GENERAL DISEASES gave rise to a higher ratio of admissions than in 1869 in all the Divisions, except Poona and Scinde, and to a higher ratio of mortality except in the Mhow and Aden divisions, at Deolalee, and on the march.

*Continued fevers* were more prevalent than in the preceding year in all the Divisions, except the Presidency, Poona, and Aden, and among troops on the march. The increase was most marked in the Mhow Division, and at Deolalee. In the former it occurred principally in the 15th Hussars and 59th Regiment at Mhow, and, to a less extent, in the 1st Battalion 8th Regiment at Nusseerabad and Neemuch. Deolalee being a depôt, the prevalence of fever cannot be traced to any particular corps.

*Paroxysmal fevers* gave rise to a much higher ratio of admissions than in 1869 in all the Divisions except Poona, in which it was identical in the two years, and Scinde, where it underwent a reduction of nearly one-half. The increase was greatest in the Presidency Division, from the prevalence of ague in the 95th Regiment. It was also very marked at Mhow in the 15th Hussars, both the batteries of Artillery, and the 59th Regiment; at Aden, in the 1st Battalion 7th Regiment; and, though to a less extent, at Deolalee; at the latter station, however, although the increase was not so marked, the ratio of admissions was extremely high, amounting to nearly two admissions in the year for every man serving. In Scinde there was a great reduction upon the admissions of the preceding year, but this was the result of the removal in January, from Kurrachee, of the 1st Battalion 21st Regiment which, in 1869, had suffered to such an extent from malarious fever. Of the 634 cases of paroxysmal fevers, shown in the above Table, 122 occurred in that corps previously to its removal from the Division. The mortality by these fevers was higher than in the preceding year in all the Divisions except Aden and among troops on the march, and was particularly high in the Northern, the Presidency, and Mhow Divisions; in the first among the Royal Artillery at Ahmedabad, and the 49th Regiment at Deesa; in the last among the Royal Artillery at Nusseerabad, and 15th Hussars and 59th Regiment at Mhow. The ratio of deaths in the Presidency Division was high, but this was merely a result of two deaths occurring in a small force, and was one of those fluctuations which arise from limited numbers under observation.

*Malignant cholera* caused one death among the troops during the year. It occurred in the D Battery E Brigade, Royal Horse Artillery, on the march from Mhow to Kirkee.

*Syphilis* furnished a higher ratio of admissions than in 1869 in all the Divisions except Poona, Mhow, and troops on the march. The highest ratio was in the Northern Division, and next to it in the Presidency and Mhow Divisions. Its prevalence at the principal stations throughout the Command compared with the results of the preceding year is shown in the following Tables:—

| | 1869. | 1870. | | 1869. | 1870. |
|---|---|---|---|---|---|
| Colaba .. .. | 160·0 | 114·4 | Neemuch .. .. | 135·2 | 68·2 |
| Poona .. .. | 99·5 | 81·1 | Nusseerabad .. | 265·4 | 131·6 |
| Sattara .. .. | 15·4 | 2·1 | Ahmedabad.. .. | 44·2 | 96·2 |
| Ahmednuggur .. | 100·5 | 68·8 | Deesa .. .. | 67·8 | 223·2 |
| Asseerghur .. .. | 47·6 | 132·3 | Mount Aboo .. | 122·0 | 103·4 |
| Belgaum .. .. | 169·1 | 99·0 | Kurrachee .. .. | 71·5 | 98·1 |
| Kirkee .. .. | 207·0 | 119·8 | Hydrabad .. .. | 31·2 | 36·4 |
| Mhow .. .. | 80·0 | 106·8 | Aden .. .. | 47·6 | 44·5 |
| Indore .. .. | 102·6 | 139·5 | Deolalee .. .. | 15·4 | 82·6 |

This Table shows an increase at one-half of the stations and a decrease at the others. The increase was greatest at Deesa, where the 49th Regiment had the large number of 112 cases of primary syphilis. The decrease was most marked at Nusseerabad where, in 1869, the admissions had amounted to upwards of one-fourth of the mean strength.

*Bombay.* *Scrofula and Phthisis* were less prevalent than in the preceding year in all except the Northern Division and at Deolalee, but the latter being a depôt cannot fairly be brought into comparison, as the cases are sent there from other stations to be invalided. In all, except Deolalee, the admissions and deaths by these diseases were considerably under the proportion among troops serving in the United Kingdom.

*Anæmia.*—The admissions under this head, generally the result of intermittent fever or other malarious disease, did not differ greatly in the different Divisions, except that Scinde furnished a very high proportion, but one-third of the cases there were from the 1st Battalion 21st Regiment during the short period it served in that Division in the beginning of the year. The proportion of admissions under this head at Deolalee was also considerably above the average of the Command.

Local Diseases.—*Diseases of the Nervous System* furnished almost exactly the same proportion of admissions as in the preceding year at Deolalee and among troops on the march, but a lower ratio in all the Divisions. The mortality was higher in the Northern Division, at Deolalee, and on the march, but lower in all the others. The reduction in the admissions was chiefly in sunstroke, apoplexy, epilepsy, and mental diseases, but there was an increase in the cases of neuralgia. In the deaths the decrease occurred in apoplexy; those by sunstroke were almost identical in the two years; four occurred at Ahmedabad, three at Aden, two at Nusseerabad, and two at Hydrabad; at none of the other stations did more than one death occur.

*Diseases of the Eye* were much less prevalent than in the preceding year in all the Divisions except the Presidency, where the ratio in the two years corresponded very closely. There was an increase in the admissions at Deolalee. In none of the corps did it prevail as an epidemic. The 83rd Regiment which arrived from the Mediterranean in April, had the highest ratio of admissions, and in it there were only 28 cases of ophthalmia in an average annual strength of 600 men.

*Diseases of the Ear* were more than twice as high in Scinde as in any of the other Divisions. The excess occurred in the 66th Regiment, which arrived at Kurrachee in April from home, and in which 19 cases of inflammation and four of deafness occurred in the succeeding nine months. No remarks on the cases appear in the report of the Medical Officer in charge.

*Diseases of the Circulatory System* were less prevalent and fatal than in 1869. The only Divisions in which they exceeded the average of the Command were Mhow and Scinde, in the former from the admission of a number of cases of palpitation in the 1st Battalion 8th Regiment at Nusseerabad, and in the 59th Regiment at Mhow, and in the Scinde Division, from the same cause, in the 66th Regiment at Kurrachee.

*Diseases of the Respiratory System* show a marked increase in the admissions into hospital in the Presidency and Scinde Divisions, and a slight increase at Aden, but there has been no corresponding addition to the mortality. The increase in the Presidency occurred in the 95th Regiment, and was due to bronchitis, and in the Scinde Division, to the same disease occurring in the B Battery, 18th Brigade Royal Artillery and the 66th Regiment at Kurrachee. The Medical Officer in charge of the Artillery attributes the prevalence of bronchitis at Kurrachee to exposure of the men to the influence of the cool sea breeze while perspiring freely.

*Diseases of the Digestive System* have, as in former years, given rise to a higher ratio of admissions and deaths than any class except the febrile group of general diseases. There was an increase in the proportion of admissions in the Presidency, Northern and Scinde Divisions and at Deolalee, and a decrease in all the others; and there was an increase in the mortality except at Deolalee and among troops on the march. Dysentery and diarrhœa, hepatitis, dyspepsia and tonsillitis were the most prevalent, and dysentery and hepatitis the most fatal diseases of this class. The admissions and deaths by dysentery, diarrhœa and hepatitis were in the following proportion in each of the military divisions.

| Military Divisions. | 1869. | 1870. | Military Divisions. | 1869. | 1870. |
|---|---|---|---|---|---|
| Presidency .. .. | 40·0 | 276·6 | Scinde .. .. | 139·7 | 246·2 |
| Poona .. .. | 122·8 | 97·4 | Aden .. .. | 116·4 | 84·5 |
| Mhow .. .. | 153·9 | 139·9 | Deolalee .. .. | 320·3 | 391·4 |
| Northern .. .. | 114·4 | 107·3 | | | |

There was a marked increase in the prevalence of these diseases in the Presidency and Scinde Divisions, but in the former the ratio had been very low in 1869, and in Scinde there had been a very considerable reduction in that year; there was also a great excess at Deolalee. The excess of admissions in the Presidency and Scinde Divisions was chiefly for diarrhœa. The Mhow Division furnished the highest relative proportion of cases of hepatitis, principally at Neemuch and Nusseerabad, and also, though not in so marked a degree, at Mhow. In Scinde the excess of diarrhœa occurred at Kurrachee. The high ratio at Deolalee was, as in the preceding year, due to that disease.

*Diseases of the Urinary System.*—The admissions have been higher than in the preceding year in all the Divisions except Mhow, in which there was a trifling decrease. The excess was entirely in gonorrhœa, and was most marked in the Presidency and Northern Divisions, and least in the Poona Division. Among troops on the march the ratio in the two years was almost identical.

CONDITIONS, &c.—The high ratio of admissions under the head of general debility in the Scinde Division occurred in the 66th Regiment at Kurrachee and Hydrabad, and was probably the consequence of ague among the men newly arrived in India.

The sickness, mortality and invaliding in each corps serving in the Command are shown in the following Table:—

| Regiments. | Average Annual Strength. | Admitted into Hospital. | Deaths. | | | Annual Ratio per 1,000. | | Stations during the Year. | |
|---|---|---|---|---|---|---|---|---|---|
| | | | In India. | Of Invalids. | Total. | Admitted. | Died. | | |
| CAVALRY. | | | | | | | | | Months. |
| 3rd Hussars .. | 475 | 380 | 6 | 1 | 7 | 800·0 | 14·74 | Ahmednuggur | 12 |
| 15th „ .. | 487 | 1,063 | 6 | .. | 6 | 2182·9 | 12·32 | On the march Mhow | 1 1/3 |
| Total Cavalry. | 962 | 1,443 | 12 | 1 | 13 | 1500·0 | 13·61 | | |
| ROYAL ARTILLERY. | | | | | | | | | |
| | | | | | | | | Batt. | |
| | | | | | | | | A, Kirkee | 2/3 |
| | | | | | | | | Ahmednugger | 11 1/3 |
| | | | | | | | | B, Kirkee | 10 2/3 |
| E Brigade R.H.A. | 579 | 777 | 1 | 4 | 5 | 1342·0 | 8·63 | On march Mhow | 1 1/3 |
| | | | | | | | | C, Hydrabad | 12 |
| | | | | | | | | D, Mhow | 11 |
| | | | | | | | | On march | 1 |

*Bombay.*

| Regiments. | Average Annual Strength. | Admitted into Hospital. | Deaths. In India. | Deaths. Of Invalids. | Deaths. Total. | Annual Ratio per 1,000. Admitted. | Annual Ratio per 1,000. Died. | Stations during the Year. Batt. | Months. |
|---|---|---|---|---|---|---|---|---|---|
| RL. ARTILLERY—*continued.* | | | | | | | | | |
| | | | | | | | | Hd.-Qrs. Deolalee | 10½ |
| | | | | | | | | Colaba | 1½ |
| | | | | | | | | No. 1, Mhow | 12 |
| | | | | | | | | No. 2, Aden | 12 |
| | | | | | | | | No. 3, Aden | 12 |
| 6th Brigade R. A. | 478 | 592 | 7 | 1 | 8 | 1238·5 | 16·74 | No. 4, Colaba | 2 |
| | | | | | | | | Poona | 10 |
| | | | | | | | | No. 5, Belgaum | 10⅔ |
| | | | | | | | | On march | 1 |
| | | | | | | | | Colaba | ⅓ |
| | | | | | | | | No. 6, Colaba | 1⅔ |
| | | | | | | | | Poona | 10½ |
| | | | | | | | | B, Kirkee | 2 |
| | | | | | | | | Poona | 10 |
| | | | | | | | | D, On march | ⅔ |
| 9th Brigade R. A. | 571 | 1226 | 19 | 1 | 20 | 2147·1 | 35·03 | Nusseerabad | 11⅓ |
| | | | | | | | | E, Deolalee | 2 |
| | | | | | | | | On march | 1 |
| | | | | | | | | Kirkee | 9 |
| | | | | | | | | F, Ahmedabad | 12 |
| | | | | | | | | A, Ahmedabad | 10⅔ |
| | | | | | | | | On march | 1⅓ |
| | | | | | | | | B, Kurrachee | 12 |
| | | | | | | | | C, Belgaum | 12 |
| 18th Brigade R.A. | 870 | 1451 | 12 | 3 | 15 | 1667·8 | 17·24 | D, Kirkee | 10½ |
| | | | | | | | | On march | 1½ |
| | | | | | | | | E, Sholapoor | 1 |
| | | | | | | | | On march | ⅔ |
| | | | | | | | | Kirkee | 10⅓ |
| | | | | | | | | F, Neemuch | 12 |
| Total Artillery.. | 2498 | 4046 | 39 | 9 | 48 | 1619·7 | 19·22 | | |
| INFANTRY. | | | | | | | | | |
| 2nd Bn. 1st Foot. | 107 | 119 | 2 | .. | 2 | 1112·2 | 18·69 | Nusseerabad | ⅔ |
| | | | | | | | | On march to Bengal. | 1 |
| | | | | | | | | Bombay | 2⅓ |
| 1st „ 2nd „ | 895 | 915 | 10 | 5 | 15 | 1022·3 | 16·76 | Poona | 9⅓ |
| | | | | | | | | On march | ⅓ |
| | | | | | | | | Detachment at Sattara. | |
| | | | | | | | | En route to Aden | ½ |
| 1st „ 7th „ | 643 | 765 | 8 | 1 | 9 | 1178·7 | 13·86 | Aden | 10½ |
| | | | | | | | | Embarked for England. | |
| | | | | | | | | On march | ⅔ |
| 1st „ 8th „ | 887 | 2,325 | 24 | | | 2621·1 | 28·19 | Nusseerabad | 11⅓ |
| | | | | | | | | Detachment at Neemuch. | |

| Regiments. | Average Annual Strength. | Admitted into Hospital. | Deaths. | | | Annual Ratio per 1,000. | | Stations during the Year. |
|---|---|---|---|---|---|---|---|---|
| | | | In India. | Of Invalids. | Total. | Admitted. | Died. | |
| INFANTRY—*cont.* | | | | | | | | months. |
| 1st Bn. 21st Foot | 68 | 141 | 2 | 5 | 7 | 2076·5 | 102·94 | Kurrachee with Detachment at Hydrabad 1<br>Proceeded to Madras. |
| 49th Regiment .. | 866 | 1,257 | 18 | 1 | 19 | 1451·5 | 21·94 | Deesa 11⅓<br>On march ⅓<br>Poona ⅓<br>Detachment at Colaba. |
| 59th „ .. | 900 | 1,551 | 8 | 2 | 10 | 1726·7 | 11·11 | Poona 2<br>On march ⅓<br>Mhow, with Det. at Indore 9⅔ |
| 66th „ .. | 677 | 1,260 | 15 | .. | 15 | 1861·2 | 22·16 | Arrived from England.<br>Kurrachee 9.<br>With Detachment at Hydrabad |
| 83rd „ .. | 601 | 633 | 12 | .. | 12 | 1053·2 | 19·97 | Arrived from Gibraltar.<br>Poona 8⅔ |
| 95th „ .. | 430 | 887 | 7 | 2 | 9 | 2064·4 | 20·93 | Mhow 2<br>On march ⅓<br>Colaba 6⅔<br>Embarked for England. |
| 108th „ .. | 878 | 806 | 11 | .. | 11 | 918·0 | 12·53 | Belgaum 10½<br>On march 1½ |
| 3rd Bn. Rifle Brig. | 53 | 67 | 1 | .. | 1 | 1264·1 | 18·87 | Arrived from Bengal.<br>En route to Aden ½<br>Aden 1 |
| **Total Infantry..** | 7,011 | 10,729 | 118 | 17 | 135 | 1530·3 | 19·26 | |

The admissions were, as in the preceding year, highest in Artillery and lowest in Cavalry, and the difference between the latter and Infantry was very slight. The mortality was lowest in Cavalry and highest in Infantry, but the latter was almost identical with that of the Artillery, the difference amounting only to ·04 per 1,000 of the strength.

The admissions in the 15th Hussars at Mhow were more than twice and a-half as high as in the 3rd Hussars at Ahmednuggur, the difference being due to the prevalence of fever and to a slight extent, also, of dysentery and diarrhœa; but the mortality of the 15th was a little lower than that of the 3rd, owing to the death of an invalid from the latter.

In the Artillery the ratio of admissions and deaths was highest in the 9th Brigade, chiefly from the prevalence of fever in the D Battery at Nusseerabad, the F Battery at Ahmedabad, and, though to a less extent, the E Battery at Deolalee and Kirkee. The D and F Batteries had the highest ratio of mortality of all the batteries in the Command. The ratio of sickness

*Bombay.* was lowest in the 6th Brigade, and of mortality in the E Brigade Royal Horse Artillery.

In the Infantry the admissions, and the deaths also, omitting the 1st Battalion 21st Regiment for the short period of its service in the Command, were highest in the 1st Battalion 8th Regiment at Nusseerabad and Neemuch, from the great prevalence of fever. The ratio of admissions was lowest in the 108th Regiment at Belgaum, and of deaths in the 59th at Poona, Mhow and Indore. The extremely high rate of deaths in the 1st Battalion 21st Regiment was due to the deaths of five invalids on their passage to England.

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SANITARY REPORT.

Inspector-General Mouat, V.C., C.B., reports:—

*Barracks.*—Some of the new barracks, that were in course of construction at the time of the discovery of the deficit in the Indian revenue, were brought to completion during the year, and were taken into occupation by the troops. In other instances, where the works were not so far advanced, no progress has been made from the date when they were first ordered to be discontinued.

As a rule, these new barracks give excellent accommodation, and are favourably reported on by the Medical Officer. The upper stories are generally used as dormitories; but occasionally, as at Poona for example, the lower are also ordered to be occupied this way.

*Accommodation and Ventilation.*—Notwithstanding the difference in the kind of accommodation afforded by the different barracks, the amount of cubic space and superficial area has nearly always been in accordance with the regulation, if not in excess of it, and the ventilation has generally been sufficient. It is unnecessary to make any remarks on the defects of the old barracks occupied by the Artillery at Mhow, Ahmednuggar, Poona, Baroda, Ahmedabad, Hydrabad, &c., because the construction of new barracks at these stations has either been begun, or the old buildings only remain in occupation until the troops can be accommodated elsewhere. In the Artillery barracks at Kurrachee there is a want of roof ventilation, and the windows of the upper storey are not sufficiently low to admit the breeze freely. A verandah is also much needed to protect the western part from the afternoon sun, but the Quartermaster-General reports that the remedy of these defects is under consideration.

*Flooring.*—Some progress has been made towards the removal of the mud floors. At Deolalee about one-half of the rooms are already flagged, and at Sattara and Kurrachee the defects in this respect which have been brought to notice will be attended to, even where the mud floors are allowed to remain. The practice of cowdunging has for some time been entirely discontinued, although clay washing is still had recourse to, and may perhaps be considered a less evil than the dustiness which would otherwise exist.

I believe it was generally understood some months ago that the experiment of asphalting the floors was about to be tried in the sanitarium hospital at Colaba, but although this has not been done, the Bombay municipality have laid down foot-pavements of asphalte in some of the principal streets, and it seems to answer admirably although fully exposed to the heat of a tropical sun. It must be obvious therefore that an asphalte pavement would be successful in barrack-rooms and hospitals, where its smooth even surface would be vastly preferable to that of the roughly-hewn slabs which are so frequently seen.

The Surgeon of the 59th Regiment has brought to notice a defect in the flooring of the upper stories of the barracks occupied by that corps. He says that the planks forming the floors are "so badly fitted that large chinks and "gaps exist, through which the dust from the upper storey falls into the room "beneath, and the men in the upper storey no doubt breathe over again part "of the air which has been polluted in the room below." He also states that

the matter has been represented, but that it cannot be remedied in the present state of the finances. *Bombay.*

*Lime Washing.*—The barracks have for the most part been whitewashed in the usual manner, but it is reported from some stations, such as Nusseerabad, Hydrabad, and Kurrachee, that this work could not be carried out owing to the want of funds.

*Lighting.*—The defect in the present mode of lighting still remains. In some corps kerosine lamps have been used on a small scale, although not at the public cost. In the 15th Hussars lamps of this kind, placed in large glass lanterns or shades, appear to have been supplied by the liberality of the Commanding Officer, and the pure white light of the kerosine is said to afford great satisfaction. If it be the case that kerosine is as manageable as the cocoanut oil, whilst it affords a better light at the same cost, and that its use is free from any considerable risk, it would undoubtedly be desirable to light the barrack-rooms with it, for it is universally admitted that the men cannot read in their barrack-rooms in the evenings unless they provide themselves with some light in addition to that provided by Government.

*Charcoal Fires during the Monsoon.*—Government published an order at the commencement of 1870 sanctioning charcoal fires in barracks for drying purposes during the rainy seasons. Two fires are allowed for every 10 men at Bombay, Poorundhur, Asseerghur, Aboo, Belgaum, Deolalee, and Kandalla, and one fire for every ten men at all other stations. Ten pounds of charcoal are allowed per diem for each fire, and it is burnt in iron segries or brozins This has been a great boon to the men, and is considered by many Medica Officers to have contributed greatly to the prevention of fever, rheumatism and other diseases produced by cold and moisture.

*Guard-Rooms and Cells.*—At Ahmedabad and Hydrabad the cells were considered hot and ill-ventilated, and at Ahmedabad the guard-room was too small. Steps have been taken to remedy the defects in the cells at Ahmedabad. At most other stations the prison accommodation was sufficiently good, or new cells were in process of construction.

*Latrines.*—The dry earth system of conservancy still continues in operation both for barracks and hospitals, and is found to answer well. At Asseerghur the refuse is now tilted clear off the scarp of the fort, but as it is allowed to lie unburied below, a most unpleasant effluvium from it is said to be perceived in the fort. The propriety of burning or burying the refuse was brought to the notice of the Military Authorities by the Deputy Inspector-General of Hospitals of the Poona Division, on the occasion of his inspectorial visit, Conservancy.

There appears to be a great want of latrine accommodation for native servants, hosp tal and otherwise, at Colaba. At present they have to resort to the Victoria Bunder, or to the rocky beach, which is left uncovered at low water.

*Ablutionary arrangements.*—These are generally satisfactory as to the supply of water, and a great improvement has been introduced by allowing a separate basin for each man in barracks. These basins are of steel or galvanized iron, and every man is responsible for the care of the basin supplied him.

*Rations.*—There was no change in the composition of the rations during the year, except at Deesa and Nusseerabad, where, for a brief period in July and August, preserved vegetables and lime juice were issued on the failure of fresh potatoes and other vegetables. The supplies were for the most part extremely good, and their quantity perfectly sufficient for the maintenance of health. Dieting of the Troops.

A trial was given at the commencement of the year to a sample of concentrated essence of meat which the Commissary-General had received from New Zealand, where it was prepared by the method of Mr. H. B. Roberts, a member of the New Zealand bar.

As the quantity sent was small, it was only used in one hospital, viz., at the Colaba Sanitarium, from which the report of Mr. Hulseberg, the Medical Officer in charge, was to the following effect :—

An 8-oz. tin yielded "sufficient extract to make 16½ pints of beef-tea, strong, "savoury, and palatable, free from fat and devoid of the unpleasant smell and "taste so frequently found in preserved meats and soups." It was considered very nutritious. One patient suffering from phthisis pulmonalis, whose appetite was very capricious, scarcely took any other food for some days and

*Bombay.* never tired of it, and in two cases of diarrhœa, with extreme exhaustion, in children, its use proved "highly restorative."

The tin was kept open and in use for one month, yet the extract remained good to the last. Mr. Hulseberg doubts, however, whether it would keep so well in the hot season.

The essence was used for the trial in accordance with the printed directions, but Mr. Hulseberg thinks it admits of greater dilution than that recommended by the maker.

The price of this preparation in New Zealand is 15*s.* per pound retail, and 10 per cent. less if sold wholesale. Freight, insurance, &c., extra.

A trial was also given towards the end of the year to the Australian preserved beef, but as it was done without communication with me, I am not aware in how many corps it was tried or what opinions have been formed regarding it, except indirectly and through the reports of the Medical Officers of the Colaba and Aboo Sanitaria. Staff-Surgeon Husleberg says: "when "taken out of the tin after having been boiled 3 or 4 minutes, the meat appears "as a stringy, tasteless mass. The gravy is rich, in fact contains all the "goodness of the meat. The men themselves complained that the meat was too "rich, and were not able to have any of it for breakfast as they do with their "fresh beef, and further there is a great difficulty in dividing it for the married "people." Mr. Hulseberg also considers that 1 lb. of the meat is barely sufficient for a ration as such a large quantity of fat has to be skimmed off the soup, and cannot be eaten in this country to such an extent as in a cold one.

At Aboo a more favourable opinion of the meat may have been formed, as the temperature at that station is lower and the men have no other meat than mutton, except a ration of pork once a month, so that the beef may not only keep in better condition but the men's appetites may be less fastidious. Still Assistant-Surgeon Orwin, the Medical Officer in charge, remarks, "many of "the men do not like the beef as it is too much boiled, so much so that the "the meat is reduced to a mass of fibres and without taste; and when cooked "again, the fat floats like oil globules on the soup."

*Supply of Ice.*—Government having ordered a small ice machine to be supplied to the Infantry hospitals at Nusseerabad and Deesa, the machines were sent up from Bombay in the cold season, and will be used during the hot season of 1871. The reports regarding them will therefore be made next year.

*Water Supply.*—The water for drinking purposes remains much the same at the majority of stations as it was last year. At Ahmednuggar, however, the supply has been greatly improved and increased by the cleansing and repairing of the Bhinger Aqueduct, and the water is now considered unobjectionable. At Nusseerabad it appears from the report of the Quartermaster-General that, "water filter carts are now under trial, and the question of water supply for "the station is before the Government of India."

Several of the Silicated Carbon Company's patent filters have been under trial lately. It is generally acknowledged that these filters surpass the Chatty filters in purifying power, nevertheless they are not liked by the men or even by a good many Medical Officers, because they do not filter so rapidly or *cool the water so much* as the Chatty filter."

*Clothing and Bedding.*—The clothing for the Infantry may now be considered well adapted to this climate. In the regiments which were marching during the relief season some cases of foot soreness occurred, but not more than must be always expected when hard leather boots are worn in a climate where the skin becomes so soft and liable to chafe owing to the profuseness of the perspiration.

The serge coat which has been issued to the Artillery affords great satisfaction, and it is only to be regretted that Government has not allowed serge trowsers as well. In the Foot Artillery, at any rate, there would appear to be no reason why serge trowsers should not be as suitable as in the Infantry. On the score of economy the thick cloth trowsers may be considered best for mounted duties, but it would be a very great boon if they could be reserved for those duties only.

In the Cavalry the materials for the coat and trowsers are the same as in

England, and are manifestly ill adapted to this climate. A serge dress is highly desirable for this arm of the service. *Bombay.*

Medical Officers do not appear to be satisfied with the present helmet, the defects of which are—that it does not sufficiently protect the temples and the back of the neck, that it is too thin at the top to prevent the penetration of the solar heat, that it is unnecessarily heavy in proportion to the protection which it does afford, and that it is not waterproof.

The bedding is generally considered sufficient in quantity and well adapted to the country. At some of the colder stations, however, an extra blanket is desirable during the winter season, and was in fact issued on the recommendation of the Medical Officers.

On this subject Assistant-Surgeon Mackay, Royal Horse Artillery, has remarked that the English blankets differ considerably in weight, and he suggests that when issued to the men they should not only be of the size laid down by the regulations, but that they should be of a certain weight. I consider this suggestion well worthy of attention as every one is aware that although a blanket may be of English make, it may nevertheless be a flimsy and indifferent article.

*Venereal Diseases.*—There was an increase of venereal disease in the aggregate in 1870 as compared with 1869, but it is important to note that the increase was solely in the less preventible gonorrhœal diseases. Of cases of primary syphilis there was even a slight diminution; nevertheless, it is not satisfactory to find that there was an increase of primary syphilis at Deesa, Ahmedabad, and Mhow, and that at the first of these stations it was even of serious extent. At Deesa there were between 4 and 5 times as many cases of primray syphilis in 1870 as in 1869. At Ahmedabad the admissions for the same class were nearly 4 times as many as in 1869, whilst at Mhow the increase was about one-third.

Lock Hospitals have been established under section 1 of Bombay Act III of 1867 at the following stations, viz.: Aden, Ahmednuggar, Bombay, Belgaum Deesa, Kurrachee, Mhow, Nusseerabad, Poona, Ahmedabad, Asseerghur Deolalee, Hydrabad, Neemuch, Sattara, and Sholapore.

Special arrangements have been provided at several stations for the private ablutions of men at night.

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## *Section* II.

### *On the Extent of Invaliding.*

There were 2,881 invalids sent home from India during the year, and 1,289 finally discharged the Service at Netley, being respectively in the ratio of 52·02 and 23·27 per 1,000 of mean strength, and both considerably higher than in the preceding year. The increase in the proportion sent home was confined to the Madras and Bombay Commands, there having been a slight decrease from Bengal. The numbers sent home from each Command were:—From Bengal, 1,692; from Madras, 657; from Bombay, 361; and from the 1st Battalion 21st Regiment, 171 men. *India.*

The influence of the different classes of diseases as causes of invaliding is shown in the following Table, framed from Abstract No. 21 in the Appendix:—

*India.*

| Station | Invalids sent home from Bengal. | Madras. | Bombay. | 1st Bn. 21st Reg. | Invalids from India discharged the service at Netley. |
|---|---|---|---|---|---|
| Mean Strength | 34,090 | 9,936 | 10,557 | 797 | 55,380 |
| Continued Fevers | 2 | 1 | .. | .. | .. |
| Paroxysmal „ | 114 | 12 | 21 | 89 | 50 |
| Rheumatism | 109 | 24 | 17 | 1 | 37 |
| Syphilis | 96 | 54 | 20 | .. | 103 |
| Scrofula and Phthisis | 125 | 54 | 57 | 2 | 244 |
| Anæmia | 134 | 20 | 22 | .. | 50 |
| Other Constitutional Diseases | 8 | 1 | 4 | 4 | 3 |
| Diseases of the— | | | | | |
| Nervous system | 83 | 32 | 26 | 2 | 69 |
| Eye | 23 | 4 | 8 | .. | 27 |
| Ear | 14 | 5 | 1 | .. | 10 |
| Nose | .. | .. | .. | .. | 1 |
| Circulatory system | 166 | 45 | 36 | 5 | 211 |
| Absorbent „ | 2 | .. | .. | .. | 2 |
| Respiratory „ | 48 | 22 | 15 | 1 | 32 |
| Digestive „ | 395 | 232 | 76 | 21 | 204 |
| Urinary „ | 24 | 2 | 6 | .. | 25 |
| Generative „ | 5 | 4 | 4 | .. | 14 |
| Organs of Locomotion | 19 | 13 | 5 | .. | 33 |
| Cellular Tissue | 1 | .. | 1 | .. | 6 |
| Cutaneous system | 17 | 10 | 5 | .. | 22 |
| Debility | 285 | 113 | 31 | 46 | 110 |
| Accidental Injuries | 19 | 9 | 6 | .. | 26 |
| Homicidal „ | 1 | .. | .. | .. | .. |
| Surgical Operations | 2 | .. | .. | .. | 10 |
| Total | 1,692 | 657 | 361 | 171 | 1,289 |
| Ratio per 1,000 of mean Strength 1870 | 49·62 | 66·12 | 34·19 | 214·55 | 23·27 |
| Ratio per 1,000 of mean Strength 1860-9 | 39·07 | 49·29 | 33·40 | .. | 18·25 |

Compared with the results of the preceding year, there has been no marked change in the invaliding from Bengal; there has been a marked increase from Madras, chiefly in diseases of the digestive system, debility, and anæmia, and from Bombay in paroxysmal fevers, scrofula and phthisis, anæmia, diseases of the circulatory and digestive systems, and debility; but the increase from Bombay scarcely raised the ratio above the average, the proportion in 1869 having been extremely low. The invaliding from the 1st Battalion 21st Regiment was chiefly caused by paroxysmal fevers, dysentery, and general debility.

The number discharged the Service at Netley was 5 per 1,000 above the average of the preceding ten years; a result, no doubt, of the two years 1869 and 1870 having been very unhealthy. Scrofula and phthisis, diseases of the circulatory and digestive systems, debility (the result of tropical service), and syphilis were the principal causes of disability.

*Section* III.

*Mean Daily Sick.*

*India.*

The average number constantly non-effective from sickness during the year 1870 was, in Bengal, 1,945; in Madras, exclusive of 1st Battalion 21st Regiment, 596; in Bombay, 604; and in 1st Battalion 21st Regiment at Bungalore, 87.

The following Table gives the usual information on this subject, based upon these numbers:—

| | Bengal. | | Madras. | | Bombay. | | 1st Bn. 21st Reg. |
|---|---|---|---|---|---|---|---|
| | 1870. | 1860-69. | 1870. | 1860-69. | 1870. | 1860-69. | 1870. |
| Ratio per 1,000 constantly Sick .. | 57·05 | 63·02 | 59·98 | 63·04 | 57·21 | 61·46 | 109·12 |
| | Days. | Days. | Days. | Days. | Days. | Days. | Days. |
| Average Sick Time to each Soldier .. | 20·82 | 23·00 | 21·89 | 23·01 | 20·88 | 22·43 | 39·84 |
| Average Duration of Cases .. .. | 12·29 | 13·74 | 17·09 | 16·56 | 13·58 | 14·74 | 10·01 |

The proportion constantly sick was rather lower than in 1869 in Bengal and Madras, but was higher in Bombay. In the 21st Regiment it amounted to upwards of one-tenth of the strength. The duration of the cases shows a slight reduction in Bengal, and a slight increase in the other two Commands, compared with the results of the preceding year. In the 21st Regiment it amounted to 10 days.

*Section* IV.

*On the Influence of Age on Mortality.*

The following Table framed from Abstract No. 22 in the Appendix, shows the mortality at different ages among the soldiers serving in India throughout the year, and the average of the preceding nine years:—

*India.*

| | Under 20 years. | | 20 and under 25. | | 25 and under 30. | | 30 and under 35. | | 35 and under 40. | | 40 and upwards. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Strength on 1st January. | Died. | Strength on 1st January. | Died. | Strength on 1st January. | Died | Strength on 1st January. | Died. | Strength on 1st January. | Died | Strength on 1st January. | Died. | |
| Bengal .. .. .. | 1,948 | 15 | 8,775 | 157 | 9,407 | 185 | 6,750 | 215 | 2,486 | 109 | 370 | 32 | |
| Madras .. .. .. | 657 | 6 | 2,145 | 33 | 2,898 | 65 | 2,447 | 77 | 710 | 38 | 128 | 3 | |
| Bombay .. .. .. | 710 | 5 | 2,547 | 44 | 1,975 | 29 | 1,364 | 31 | 673 | 26 | 111 | 7 | |
| Total .. .. | 3,215 | 26 | 13,467 | 234 | 14,280 | 279 | 10,561 | 323 | 3,869 | 173 | 609 | 42 | |
| Ratio of Deaths per 1,000 of Strength .. .. | 8·09 | | 17·15 | | 19·54 | | 30·58 | | 44·71 | | 68·96 | | |
| Ditto 1861–69 .. .. | 9·25 | | 17·59 | | 24·63 | | 34·17 | | 44·13 | | 60·88 | | |

The mortality in 1870 corresponded very closely with the average except at the ages 25–30 and 30–35, in each of which there was a considerable decrease. There was a decrease also above 40, but the numbers at that age are too few to justify any deduction from the results. The Table shows a marked increase of mortality with the advance of years except at the period 25–30, when the ratio is only slightly above that of the preceding quinquennium.

## XV.—ON THE HEALTH OF TROOPS ON BOARD SHIP.

### STATISTICAL REPORT.

The Troops embarked during the year are shown by the Ship Returns to have been as follows:— *Troops on Board Ship.*

| | | |
|---|---|---|
| I. | Troops or drafts proceeding on foreign service .... | 13,117 |
| II. | Do. returning from foreign service .... .... | 13,076 |
| III. | Do. passing by sea from one Colony to another, or from one station in a Military Command to another ... .... .... .... .... ... | 5,960 |
| IV. | Invalids and "time-expired men" returning to England .... .... ... .... .... .... | 3,460 |

The last group includes 167 time-expired men, and 126 effectives embarked with the invalids, whom it has been found impossible to separate from the latter. The rest of the time-expired men are included in the second group.

#### I. TROOPS PROCEEDING ON FOREIGN SERVICE.

From the Ship Returns it appears that 13,117 non-commissioned officers and men embarked from the United Kingdom for foreign service, representing an average *annual* strength of 1,216 men. There were 686 cases of sickness and 5 deaths among them, being respectively in the ratio of 564 and 4·11 per 1,000 of mean *annual* strength.

The following Table, framed from No. 23 in the Appendix, shows the admissions and deaths by the different classes of diseases:—

*Troops on Board Ship.*

| Order. | Stations | To the Mediterranean, America, the Cape and Ceylon. | | | | To India, *viâ* Egypt. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Number of men Embarked | 2,347 | | | | 10,770 | | | |
| | Average *Annual* Strength | 170 | | | | 1,046 | | | |
| | Diseases. | Admitted. | Died. | Ratio per 1,000 Admitted. | Ratio per 1,000 Died. | Admitted. | Died. | Ratio per 1,000 Admitted. | Ratio per 1,000 Died. |
| | I. *General Diseases.* | | | | | | | | |
| 1 | Febrile Group | 14 | .. | 82·4 | .. | 51 | 3 | 48·7 | 2·87 |
| 2 | Constitutional „ | 18 | .. | 105·9 | .. | 175 | 1 | 167·3 | ·96 |
| | II. *Local Diseases.* | | | | | | | | |
| | Diseases of the— | | | | | | | | |
| 1 | Nervous System | .. | .. | .. | .. | 3 | .. | 2·9 | .. |
| 2 | Eye | 4 | .. | 23·5 | .. | 12 | .. | 11·5 | .. |
| 3 | Ear | .. | .. | .. | .. | 1 | .. | 1·0 | .. |
| 5 | Circulatory System | .. | .. | .. | .. | 2 | .. | 1·9 | .. |
| 6 | Absorbent „ | 1 | .. | 5·9 | .. | 6 | .. | 5·7 | .. |
| 8 | Respiratory „ | 3 | .. | 17·6 | .. | 39 | 1 | 37·3 | ·96 |
| 9 | Digestive „ | 13 | .. | 76·5 | .. | 46 | .. | 44·0 | .. |
| 10 | Urinary „ | 21 | .. | 123·5 | .. | 77 | .. | 73·6 | .. |
| 11 | Generative „ | 3 | .. | 17·6 | .. | 12 | .. | 11·5 | .. |
| 12 | Organs of Locomotion | .. | .. | .. | .. | 1 | .. | 1·0 | .. |
| 13 | Cellular Tissue | 3 | .. | 17·6 | .. | 24 | .. | 22·9 | .. |
| 14 | Cutaneous System | 16 | .. | 94·1 | .. | 67 | .. | 64·0 | .. |
| | III. *Conditions, &c.* | | | | | | | | |
| | Debility | 2 | .. | 11·8 | .. | 6 | .. | 5·7 | .. |
| | V. *Injuries.* | | | | | | | | |
| 2 | Accidental | 13 | .. | 76·5 | .. | 50 | .. | 47·8 | .. |
| 6 | Judicial | 2 | .. | 11·8 | .. | .. | .. | .. | .. |
| | No appreciable disease | .. | .. | .. | .. | 1 | .. | 1·0 | .. |
| | Total | 113 | .. | 664·7 | .. | 573 | 5 | 547·8 | 4·79 |

There was no remarkable amount of either sickness or mortality among this class of troops. Syphilis and gonorrhœa were above the average on board the "Salamanca," proceeding from Gravesend to Ceylon; they were also considerably in excess on board the "Himalaya," from Queenstown to Alexandria, the diseases having been contracted most probably at the ports of embarkation.

Measles broke out on board the "Himalaya," proceeding with drafts from Portsmouth to the Cape, 13 days after embarkation; three cases occurred among the men and 17 among the children, all of which did well. Scarlet fever broke out on board the "Malabar," between Suez and Bombay; the only case among the men proved fatal; two children also died, but the Medical Officer in charge has omitted to state how many cases occurred among them. A case of enteric fever proved fatal on board the "Crocodile," eight days after embarkation at Portsmouth.

## II. Troops Returning from Foreign Service.

*Troops on Board Ship.*

The strength of the effective troops embarked at foreign stations to return to England, as shown by the Ship Returns was 13,076, representing an average *annual* strength of 1,319 men. The cases occurring among them on the voyage amounted to 568, and the deaths to 26, the former being in the ratio of 431, and the latter of 19·71 per 1,000 of mean annual strength.

The influence of the different classes of disease on the sickness and mortality is shown in the following Table framed from Abstract, No. 23 in the Appendix :—

| Order. | Diseases. | From Mediterranean, West Indies, and British America. | | | | From Cape of Good Hope and Australia. | | | | From India, *vid* Egypt. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Stations .. .. | | | Ratio per 1,000. | | | | Ratio per 1,000. | | | | Ratio per 1,000. | |
| | | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| | No. of men embarked .. | 4,432 | | | | 2,458 | | | | 6,186 | | | |
| | Average *Annual* Strength .. | 237 | | | | 455 | | | | 627 | | | |
| | I. *General Diseases.* | | | | | | | | | | | | |
| 1 | Febrile Group .. | 5 | 1 | 21·1 | 4.22 | 14 | 3 | 30·7 | 6·59 | 68 | 2 | 108·5 | 3·19 |
| 2 | Constitutional „ .. | 14 | .. | 59·1 | .. | 33 | 1 | 72·5 | 2·20 | 45 | 1 | 71·8 | 1·60 |
| | II. *Local Diseases.* Diseases of the— | | | | | | | | | | | | |
| 1 | Nervous System .. | 1 | .. | 4·2 | .. | 3 | .. | 6·6 | .. | .. | .. | .. | .. |
| 2 | Eye .. .. .. | 5 | .. | 21·1 | .. | 17 | .. | 37·3 | .. | 10 | .. | 15·9 | .. |
| 5 | Circulatory System .. | .. | .. | .. | .. | 2 | 1 | 4·4 | 2·20 | 4 | 1 | 6·4 | 1·60 |
| 6 | Absorbent „ .. | 6 | .. | 25·3 | .. | .. | .. | .. | .. | 13 | .. | 20·7 | .. |
| 7 | Ductless Glands .. | .. | .. | .. | .. | 1 | .. | 2·2 | .. | .. | .. | .. | .. |
| 8 | Respiratory System .. | 11 | 1 | 46·4 | 4·22 | 15 | .. | 32·9 | .. | 25 | 3 | 39·9 | 4·78 |
| 9 | Digestive „ .. | 9 | .. | 38·0 | .. | 11 | .. | 24·2 | .. | 37 | 9 | 59·0 | 14·35 |
| 10 | Urinary .. „ .. | 19 | 1 | 80·2 | 4·22 | 39 | .. | 85·7 | .. | 9 | .. | 14·3 | .. |
| 11 | Generative „ .. | 3 | .. | 12·7 | .. | 4 | .. | 9·0 | .. | 3 | .. | 4·8 | .. |
| 12 | Organs of Locomotion.. | 2 | .. | 8·4 | .. | .. | .. | .. | .. | 3 | .. | 4·8 | .. |
| 13 | Cellular Tissue.. .. | 3 | .. | 12·7 | .. | 7 | .. | 15·4 | .. | .. | .. | .. | .. |
| 14 | Cutaneous System .. | 8 | .. | 33·7 | .. | 47 | .. | 103·3 | .. | 5 | .. | 8·0 | .. |
| | III. *Debility.* .. | .. | .. | .. | .. | .. | . | .. | .. | 1 | .. | 1·6 | .. |
| | IV. *Poisons* .. | 6 | 1 | 25·3 | 4·22 | 2 | 1 | 4·4 | 2·20 | 1 | .. | 1·6 | .. |
| | V. *Injuries.* | | | | | | | | | | | | |
| 2 | Accidental .. .. | 20 | .. | 84·4 | .. | 26 | .. | 57·1 | .. | 11 | .. | 17·5 | .. |
| | Total .. .. | 112 | 4 | 472·6 | 16·88 | 221 | 6 | 485·7 | 13·19 | 235 | 16 | 374·8 | 25·52 |

The admissions were moderate in all the groups, and the deaths, except in the men returning from India, among whom they amounted to 25·52 per 1,000 of mean annual strength. Among the troops returning from the West Indies, a death from yellow fever occurred in a convict on board the "Tamar," between Jamaica and Barbadoes; no other case occurred on board. In the first column of the Table, the ratio of admissions by urinary diseases is high,

*Troops on Board Ship.*

chiefly from a number of cases of gonorrhœa having come under treatment among the troops returning from Bermuda. The admissions by both groups of general diseases were high among the troops returning from India; the febrile group, from the occurrence of a large number of cases of ague on board the "Jumna," in the 19th Hussars and 93rd Regiment, and also on board the "Euphrates," and the constitutional, from syphilis on board the "Jumna."

The admissions by the constitutional group were also high among the troops returning from the Cape, owing to a number of cases of syphilis among the men of the Royal Artillery and Engineers, the 2nd Battalion 11th Regiment, and a detachment of the 1st Battalion 9th Regiment.

The high rate of mortality among the troops returning from India was principally due to dysentery, diarrhœa and hepatitis, contracted in that country.

Among the fatal cases in the other groups, there were four from fever on the voyage from Australia, but no details have been given as to their supposed origin.

### III. Troops Proceeding from one Colony or Station to another.

The Ship Returns show the number of men embarked for passage from one Colony or Station to another to have been 5,960, representing an *annual* mean strength of 310 men. Of these, 1,037, or a mean of 96 were black troops. Among the white troops there were 94 admissions and three deaths, being in the ratio of 439 and 14·01 per 1,000 of mean *annual* strength; and among the black there were 43 admissions and one death, or 448 and 10·42 per 1,000 respectively.

The diseases by which the sickness and mortality were caused are detailed in Abstract No. 24 in the Appendix, from which the following Table has been framed:—

| | | White Troops. | | | | Black Troops. | | | |
|---|---|---|---|---|---|---|---|---|---|
| Strength Embarked .. .. | | 4,923 | | Ratio per 1,000 | | 1,037 | | atio per 1,000. | |
| Average *Annual* Strength .. | | 214 | | | | 96 | | | |
| Order. | Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| | I. *General Diseases.* | | | | | | | | |
| 1 | Febrile Group .. | 16 | 1 | 74·8 | 4·67 | 8 | | 83·3 | .. |
| 2 | Constitutional „ .. | 24 | .. | 112·2 | .. | 10 | | 104·2 | .. |
| | II. *Local Diseases.* Diseases of the— | | | | | | | | |
| 1 | Nervous system .. .. | 2 | 1 | 9·3 | 4·67 | .. | .. | .. | .. |
| 2 | Eye .. .. .. .. | 2 | .. | 9·3 | .. | 2 | .. | 20·8 | .. |
| 6 | Absorbent System .. .. | 3 | .. | 14·0 | .. | .. | .. | .. | .. |
| 8 | Respiratory „ .. .. | 5 | .. | 23·4 | .. | 4 | .. | 41·7 | .. |
| 9 | Digestive „ .. .. | 13 | .. | 60·7 | .. | 6 | 1 | 62·5 | 10·42 |
| 10 | Urinary „ .. .. | 13 | .. | 60·7 | .. | 1 | .. | 10·4 | .. |
| 12 | Organs of Locomotion .. | 1 | .. | 4·7 | .. | .. | .. | .. | .. |
| 13 | Cellular Tissue .. .. | .. | .. | .. | .. | 1 | .. | 10·4 | .. |
| 14 | Cutaneous System .. .. | 5 | .. | 23·4 | .. | 5 | .. | 52·1 | .. |
| | IV. *Poisons* .. .. | 4 | 1 | 18·7 | 4·67 | 1 | .. | 10·4 | .. |
| | V. *Injuries.* | | | | | | | | |
| 2 | Accidental .. .. .. | 6 | .. | 28·0 | .. | 5 | .. | 52·1 | .. |
| | Total .. .. | 94 | 3 | 439·2 | 14·01 | 43 | 1 | 447·9 | 10·42 |

There appears to be nothing in the prevalence or character of the diseases among either class of troops which calls for special comment. *Troops on Board Ship.*

### IV. Invalids, &c., Returning to England.

The number of invalids of the European troops shown in the Ship Returns to have embarked for England was 3,167, and with these it has been found necessary to include 167 time-expired men, and 126 effectives, making a total of 3,460, and representing an average *annual* strength of 484 men. There were 475 of them embarked as sick, and 316 cases and 80 deaths occurred among them on board ship. These deaths have been included under the different Commands from which the men were invalided, and will be found at the end of the various Abstracts of Diseases in the Appendix.

The Ship Returns of invalids from the detachment of the Ceylon Rifles at Labuan are defective, but of 36 men whose embarkation was duly reported, six died on the passage to Ceylon. They were all embarked as sick, 22 with ague, 12 with beri-beri, and 2 with other diseases.

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## SUMMARY.

The following Table shows the principal results relative to the health of the Army at home and abroad in 1870, and the average of the ten preceding years:— *Summary.*

TABLE showing the Sickness, Mortality, and Invaliding, and the proportion constantly Non-effective from Sickness per 1,000 of Mean Strength in the Army at Home and Abroad during the year 1870, and on the Average of the ten years 1860–9.

| | Annual Ratio per 1,000 of Mean Strength. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1870. | | | | | 1860–69. | | | | |
| WHITE TROOPS. | Admitted into Hospital. | Died. | Sent Home as Invalids. | Discharged as Invalids. | Constantly Non-effective from Sickness. | Admitted into Hospital. | Died. | Sent Home as Invalids. | Discharged as Invalids. | Constantly Non-effective from Sickness. |
| United Kingdom | 809 | 9·48 | .. | 31·1 | 38·58 | 941 | 9·51 | .. | 34·1 | 47·82 |
| Gibraltar and Malta | 666 | 8·70 | 36·7 | 24·7 | 32·08 | 796 | 11·27 | 23·0 | 16·9 | 41·63 |
| Dominion of Canada | 657 | 8·63 | 23·9 | 15·5 | 30·98 | 645 | 9·32 | 16·0 | 12·8 | 30·35 |
| Bermudas | 742 | 12·06 | 20·4 | 7·3 | 38·78 | 767 | 29·88 | 20·9 | 13·6 | 39·60 |
| West Indies | 764 | 9·06 | 16·7 | 9·1 | 32·96 | 1,082 | 16·40 | 28·0 | 16·3 | 44·57 |
| St. Helena and Cape | 1,106 | 13·94 | 36·0 | 21·8 | 46·24 | 974 | 10·78 | 29·3 | 21·1 | 50·24 |
| Mauritius | 1,132 | 16·54 | 52·6 | 21·0 | 39·10 | 1,061 | 20·74 | 41·5 | 16·4 | 45·37 |
| Ceylon and Straits Settlements | 1,365 | 16 87 | 54·6 | 29·0 | 62·08 | 1,411 | 22·69 | 48·2 | 20·8 | 64·84 |
| Australasia | 772 | 8·21 | .. | .. | 39·41 | 614 | 15·63 | 20·1 | 16·9 | 34·56 |
| South China and Japan | 1,764 | 16·24 | 73·2 | 18·3 | 82·90 | 2,973 | 37·58 | 35·6 | 14·1 | 48·67 |
| India | 1,623 | 22·86 | 52·0 | 23·3 | 58·36 | 1,591 | 27·99 | 40·0 | 18·2 | 62·73 |
| On board Ship | 490 | 12·37 | .. | .. | .. | 704 | 13·12 | .. | .. | .. |
| Total | 1,095 | 14·22 | 46·1 | 26·2 | 45·71 | 1,129 | 16·69 | 33·4 | 22·83 | 49·82 |
| COLONIAL CORPS. | | | | | | | | | | |
| Malta | 834 | 3·52 | .. | .. | .. | 841 | 8·48 | .. | .. | .. |
| West Indies | 915 | 23·36 | .. | 13·9 | .. | 1,022 | 23·23 | .. | 18·9 | 52·57 |
| Western Africa | 1,002 | 20·50 | .. | | | 1,298 | 38·63 | | | |
| Ceylon and Labuan | 929 | 42·64 | .. | 47·7 | *36·64 | 1,011 | 15·07 | .. | 16·7 | 47·56 |
| South China | 1,356 | 26·01 | .. | .. | .. | 1,506 | 26·75 | 29·7 | .. | 33·32 |
| On board Ship | .. | .. | .. | .. | .. | 1,298 | 16·05 | .. | .. | 47·70 |
| Total | .. | .. | .. | .. | .. | 1,139 | 23·16 | .. | .. | .. |

* Ceylon only.

*Summary.*

The admissions have been slightly higher than in 1869, but under the average of the last ten years. The increase was chiefly in China and Japan, and in India.

The ratio of mortality was much lower than in 1869, and was 2·47 per 1,000 under the average of the decennium. The decrease was most marked in India, Bermuda, and Ceylon and the Straits Settlements.

There has been an increase in the number of invalids sent home, chiefly from the Cape and all stations to the eastward of it, but this has been attended with a very slight increase in the proportion finally discharged as invalids at Netley; the latter, however, has been 3·19 per 1,000 above the average of the ten years, the increase being chiefly among those from India and Ceylon and the Straits' Settlements.

The mean daily sick has been a little under the proportion in 1869, and shows a decrease of 5 per 1,000 compared with the average of the last ten years.

Among the Colonial Corps there has been a marked increase in the sickness and mortality in Ceylon and Labuan, due to the very unhealthy state of the detachment in the latter Island. There has also been a great increase in the admissions into hospital in China. In Western Africa the ratio of mortality was less than half that of the preceding year.

# SUPPLEMENT TO REPORT

FOR

# 1869.

## BENGAL.

### STATISTICAL REPORT.

*Bengal, 1869.* The mean strength of the European troops in the Bengal Command in 1869 was 35,173; there were 59,390 admissions into hospital, and 1,519 deaths, including 50 among the invalids on their passage home and at Netley. These numbers give the proportion of 1,688 admissions and 44·61 deaths per 1,000 of mean strength. The admissions were more than one-fifth higher than in 1868, and the deaths nearly double the proportion in that year. Compared with the results of the nine years 1860–8, there was only a slight increase in the admissions but the deaths were one-half higher than the average.

The diseases by which the admissions and deaths were caused are detailed in Abstract No. 20 in the Appendix, of which the following is a classified summary:—

| Orders. | Diseases. | Strength, 35,173. | | | | Ratio per 1,000 of Mean Strength, 1869. | |
|---|---|---|---|---|---|---|---|
| | | Admitted. | Deaths. | | | Admitted. | Died. |
| | | | In India. | Of Invalids. | Total. | | |
| | I. *General Diseases.* | | | | | | |
| 1 | Febrile Group .. .. | 27,148 | 747 | 1 | 748 | 771·8 | 21·27 |
| 2 | Constitutional Group .. | 5,884 | 93 | 22 | 115 | 167·3 | 3·27 |
| | II. *Local Diseases.* | | | | | | |
| | Diseases of the— | | | | | | |
| 1 | Nervous System .. .. | 925 | 156 | 4 | 160 | 26·3 | 4·55 |
| 2 | Eye .. .. .. .. | 911 | .. | .. | .. | 25·9 | .. |
| 3 | Ear .. .. .. .. | 215 | .. | .. | .. | 6·1 | .. |
| 4 | Nose.. .. .. .. | 23 | .. | .. | .. | ·7 | .. |
| 5 | Circulatory System.. .. | 490 | 57 | 3 | 60 | 13·9 | 1·71 |
| 6 | Absorbent „ .. .. | 505 | .. | .. | .. | 14·4 | .. |
| 7 | Ductless Glands .. | 2 | .. | .. | .. | ·1 | .. |
| 8 | Respiratory System.. .. | 1,661 | 31 | 2 | 33 | 47·2 | ·94 |
| 9 | Digestive „ .. .. | 10,250 | 333 | 15 | 348 | 291·4 | 9·89 |
| 10 | Urinary „ .. .. | 3,646 | 16 | 2 | 18 | 103·7 | ·51 |
| 11 | Generative „ .. .. | 531 | .. | .. | .. | 15·1 | .. |
| 12 | Organs of Locomotion .. | 133 | 1 | .. | 1 | 5·2 | ·03 |
| 13 | Cellular Tissue .. .. | 370 | 1 | .. | 1 | 10·5 | ·03 |
| 14 | Cutaneous System .. .. | 2,761 | .. | .. | .. | 78·5 | .. |
| | III. *Debility.* | 465 | 5 | 1 | 6 | 13·2 | ·17 |
| | IV. *Poisons.* | 254 | 24 | .. | 24 | 7·2 | ·68 |
| | V. *Injuries.* | | | | | | |
| 2 | Accidental .. .. .. | 3,106 | 24 | .. | 24 | 88·3 | ·68 |
| 3 | Homicidal .. .. .. | 2 | 4 | .. | 4 | ·1 | ·11 |
| 4 | Self-inflicted .. .. | 15 | 26 | .. | 26 | ·4 | ·74 |
| 5 | Judicial .. .. .. | .. | 1 | .. | 1 | .. | ·03 |
| | VI. *Surgical Operations.* | 5 | .. | .. | .. | ·1 | .. |
| | Diseases not specified .. | 38 | .. | .. | .. | 1·1 | .. |
| | Total .. .. .. | 59,390 | 1,519 | 50 | 1,569 | 1688·5 | 44·61 |
| | Average of 9 years, 1860–8. | .. | .. | .. | .. | 1629·2 | 30·25 |

*General Diseases* caused nearly three-fifths of the admissions and upwards of half of the deaths. The prevalence and mortality of the principal diseases comprised in this class were as follows :—

*Bengal, 1869.*

| General Diseases. | Admitted. | Died. | Ratio per 1,000 of Mean Strength. 1869. Admitted. | 1869. Died. | 1860-8. Admitted. | 1860-8. Died. |
|---|---|---|---|---|---|---|
| *Febrile—* | | | | | | |
| Eruptive Fevers .. .. | 138 | 14 | 3·9 | ·40 | 2·5 | ·29 |
| Continued „ .. .. | 6,949 | 70 | 197·6 | 1·99 | 130·8 | 1·48 |
| Paroxysmal „ .. .. | 19,050 | 117 | 541·6 | 3·32 | 462·6 | 2·08 |
| Malignant Cholera .. .. | 715 | 539 | 20·3 | 15·32 | 12·2 | 7·85 |
| Choleraic Diarrhœa .. | 76 | .. | 2·2 | .. | .. | .. |
| Influenza .. .. .. | 72 | .. | 2·0 | .. | 4·8 | .. |
| Erysipelas .. .. .. | 53 | 3 | 1·5 | ·09 | 1·6 | ·04 |
| Other Diseases of this group | 95 | 3 | 2·7 | ·09 | .. | .. |
| *Constitutional—* | | | | | | |
| Rheumatism .. .. .. | 1,775 | 2 | 50·5 | ·06 | 68·0 | ·08 |
| Syphilis .. .. .. | 3,270 | 4 | 93·0 | ·11 | 121·1 | ·27 |
| Scrofula, Phthisis, &c. .. | 487 | 102 | 13·9 | 2·90 | 10·9 | 2·47 |
| Scurvy and Purpura.. .. | 22 | .. | ·6 | .. | 1·6 | ·02 |
| Anæmia .. .. .. | 290 | 4 | 8·2 | ·11 | 4·1 | ·09 |
| Other Diseases of this group | 40 | 3 | 1·1 | ·09 | .. | .. |

All the principal diseases of the febrile group were much more prevalent and fatal than on the average of the preceding nine years.

*Eruptive fevers.*—The excess of these diseases was entirely attributable to small pox, of which there were 128 cases and 14 deaths. The rate of mortality, nearly 11 per cent. of those attacked, was unusually high in a population so carefully vaccinated as the army.

*Continued fevers.*—The admissions by these were one-half and the deaths one-third higher than the average of the nine years. There were four cases and two deaths of typhus, and 61 cases, of which 27 died, were returned as enteric fever.

*Paroxysmal fevers* also were much above the average, both in prevalence and mortality, and were still more in excess of the proportion in 1868. They amounted to upwards of two-thirds of the admissions by the febrile group of general diseases, and to nearly one-third of all the admissions into hospital in the Command. These fevers also were of a more serious character, the deaths having amounted to one in 163 cases, while on the average of the preceding nine years they were only one in 226 cases.

*Malignant cholera* has been the cause of nearly one-third of the total mortality in the Command, and of upwards of two-thirds of the deaths by the febrile group of general diseases. The mortality by it was higher than in any of the preceding nine years, except 1861 when it amounted to 23·48 per 1,000 of mean strength. But the disease was more virulent in 1869, the deaths having been in the proportion of 10 in 14·7 cases including choleraic diarrhœa, while in 1861 they were 10 in 16·2 cases.

*Rheumatism* was considerably under the average of the preceding nine years, but corresponded very closely with the ratio in 1868.

*Syphilis* however was 13 per 1,000 higher than in 1868, though 28 per 1,000 under the average of the nine years.

*Scrofula and Phthisis* show a slight increase on the results of the preceding year and both admissions and deaths were above the average of the Command.

*Anæmia* was the cause of double the average proportion of admissions, a result probably of the great prevalence of malarious fevers.

Local Diseases.—Those of the *Nervous System* gave rise to a high ratio of mortality, chiefly from the occurrence of 98 deaths from sunstroke, being three-fifths of the whole by that class. Apoplexy was the only other very fatal disease of this class; 37 deaths by it were reported.

*Diseases of the Digestive System* caused indeed a higher mortality than all the other classes of local diseases combined. Hepatitis was the most fatal, and, with the exception of diarrhœa, the most prevalent disease of this class, and next to it dysentery. Diarrhœa, though very prevalent was not a source of great mortality. The admissions and deaths by dysentery and diarrhœa combined were above the average of the preceding nine years, having been in the ratio of 143·3 and 3·98 per 1,000 respectively, while the average was 135·7 and 3·52 per 1,000. The admissions into hospital by hepatitis were 51·5 per 1,000 of the strength and the deaths 4·83 per 1,000.

*Diseases of the Urinary System* furnished a high ratio of cases, consisting chiefly of gonorrhœa and its consequences; exclusive of these, the admissions were only in the proportion of three per 1,000 of the strength, but the death rate was high, being ·50 per 1,000. There were 11 peaths from Bright's disease and two from inflammation and abscess of the kidney.

INJURIES—The admissions by accidental injuries corresponded very closely with the average, but the deaths amounted to only one-third; this, however, was to a considerable extent counter-balanced by an excess of suicidal deaths, which were more than double the average; gunshot wounds were the cause of nearly one-half, and drowning of one-fourth of these.

The following Table shows the admissions and deaths during the year at each of the principal military stations in the Command :—

| Stations. | | Average Annual Strength. | Admitted into Hospital. | Died in India. | Annual Ratio per 1,000. 1869. Admitted. | 1869. Died. | 1865-8. Admitted. | 1865-8. Died. |
|---|---|---|---|---|---|---|---|---|
| Presidency | Calcutta .. | 974 | 965 | 22 | 991 | 22·59 | 1746·1 | 27·17 |
| | Dum-Dum .. | 489 | 630 | 19 | 1,288 | 38·85 | | |
| | Barrackpore .. | 377 | 573 | 20 | 1,520 | 53·05 | 1901·1 | 33·99 |
| | Chinsurah .. | 82 | 180 | 4 | 2,195 | 48·78 | .. | .. |
| | Berhampore .. | 104 | 149 | 7 | 1,433 | 67·30 | 2411·4 | 29·36 |
| | Hazareebaugh | 687 | 786 | 11 | 1,144 | 16·01 | 1633·2 | 20·96 |
| | Darjeeling .. | 67 | 69 | .. | 1,032 | .. | .. | .. |
| Allahabad | Allahabad .. | 823 | 2,135 | 145 | 2,594 | 176·20 | 1642·0 | 32·72 |
| | Cawnpore .. | 1,054 | 1,403 | 30 | 1,331 | 28·46 | 1342·1 | 20·73 |
| | Dinapore .. | 869 | 1,251 | 21 | 1,440 | 24·16 | 1604·8 | 21·97 |
| | Benares .. | 706 | 1,309 | 23 | 1,854 | 32·58 | 1867·2 | 29·44 |
| | Chunar .. | 123 | 364 | 3 | 2,959 | 24·39 | .. | .. |
| Oude .. | Lucknow .. | 2,290 | 2,775 | 135 | 1,212 | 58·95 | 1219·5 | 19·82 |
| | Seetapore .. | 527 | 683 | 19 | 1,296 | 36·05 | 1089·4 | 19·14 |
| | Fyzabad .. | 793 | 820 | 32 | 1,034 | 40·35 | 1109·9 | 26·63 |
| | Roy Bareilly .. | 63 | 68 | 6 | 1,079 | 95·24 | .. | .. |
| Saugor .. | Saugor.. .. | 904 | 2,029 | 76 | 2,244 | 84·07 | 2267·7 | 33·24 |
| | Nowgong .. | 168 | 213 | 10 | 1,268 | 59·52 | 1080·9 | 18·96 |
| | Jubbulpore .. | 648 | 1,382 | 48 | 2,133 | 74·07 | 2148·5 | 29·23 |
| Rohilcund | Bareilly .. | 777 | 947 | 10 | 1,219 | 12·87 | 958·9 | 13·39 |
| | Shahjehanpore | 454 | 291 | 14 | 641 | 30·91 | 1534·7 | 24·31 |
| | Moradabad .. | 312 | 293 | 10 | 939 | 32·05 | 1123·6 | 11·41 |
| | Seanee* .. | 119 | 209 | 3 | 1,756 | 25·21 | .. | .. |

* Working parties during a portion of the year only.

*Bengal, 1869.*

| Stations. | | Average Annual Strength. | Admitted into Hospital. | Died in India. | Annual Ratio per 1,000. 1869. Admitted. | 1869. Died. | 1865–8. Admitted. | 1865–8. Died. |
|---|---|---|---|---|---|---|---|---|
| Gwalior .. | Morar .. .. | 768 | 1,912 | 92 | 2,490 | 119·80 | 2478·7 | 32·49 |
| | Fortress Gwalior | 270 | 459 | 19 | 1,700 | 70·37 | 1252·0 | 24·53 |
| | Jhansi .. .. | 569 | 1,767 | 24 | 3,105 | 42·18 | 2111·3 | 16·14 |
| | Seepree .. | 129 | 204 | 4 | 1,581 | 31·01 | 1867·4 | 10·12 |
| Delhi .. | Meerut .. .. | 1,405 | 2,015 | 52 | 1,434 | 37·01 | 1562·7 | 35·05 |
| | Agra .. .. | 897 | 879 | 18 | 980 | 20·07 | 1416·6 | 21·05 |
| | Delhi .. .. | 355 | 854 | 12 | 2,406 | 33·80 | 1717·3 | 28·89 |
| | Muttra .. .. | 419 | 455 | 4 | 1,086 | 9·55 | 1035·2 | 18·57 |
| | Roorkee .. | 334 | 731 | 5 | 2,189 | 14·97 | 1210·4 | 20·34 |
| | Futtyghur .. | 192 | 299 | 3 | 1,557 | 15·62 | 1252·8 | 22·43 |
| Sirbund .. | Umballa .. | 1,593 | 1,973 | 24 | 1,238 | 15·07 | 1453·9 | 16·64 |
| | Jullundur .. | 775 | 2,056 | 30 | 2,653 | 38·71 | 1466·3 | 18·65 |
| | Dugshai .. | 664 | 518 | 4 | 780 | 6·02 | 910·3 | 9·80 |
| | Subathoo .. | 629 | 1,066 | 31 | 1,695 | 49·28 | 1385·5 | 16·61 |
| | Jutogh .. | 46 | 41 | 3 | 891 | 65·22 | ... | .. |
| | Chuckratta .. | 547 | 522 | 9 | 954 | 16·45 | .. | .. |
| Lahore .. | Meean Meer .. | 974 | 3,299 | 28 | 3,387 | 28·75 | 1875·3 | 37·42 |
| | Fort Lahore .. | 116 | 258 | 7 | 2,224 | 60·34 | .. | .. |
| | Umritsur .. | 139 | 265 | 15 | 1,906 | 108·00 | 1128·7 | 36·08 |
| | Fort Kangra .. | 67 | 90 | 3 | 1,343 | 44·78 | 1098·7 | 16·45 |
| | Ferozepore .. | 909 | 1,594 | 8 | 1,754 | 8·80 | 1524·2 | 15·79 |
| | Mooltan .. | 861 | 1,782 | 23 | 2,070 | 26·71 | 1069·2 | 19·69 |
| | Dalhousie* .. | 207 | 235 | 1 | 1,140 | 4·83 | .. | .. |
| Peshawur .. | Peshawur .. | 1,673 | 4,805 | 253 | 2,872 | 151·23 | 2173·5 | 40·29 |
| | Nowshera .. | 526 | 1,153 | 24 | 2,192 | 45·63 | 1589·7 | 15·80 |
| Jhelum .. | Sealkote .. | 1,085 | 1,692 | 12 | 1,559 | 11·06 | 1261·7 | 8·49 |
| | Rawul Pindee .. | 1,723 | 3,976 | 27 | 2,308 | 15·67 | 1323·3 | 10·88 |
| | Murree Road* | 294 | 287 | 3 | 976 | 10·20 | .. | .. |
| | Campbellpore .. | 407 | 445 | 9 | 1,093 | 22·11 | 1216·7 | 15·66 |
| | Attock .. .. | 173 | 633 | 6 | 3,659 | 34·68 | 1550·3 | 16·59 |
| | Dera Ismael Khan | 97 | 258 | 2 | 2,660 | 20·62 | 828·4 | 4·88 |
| Troops on March, detached, &c. | | 1,254 | 1,760 | 40 | 1,403 | 31·90 | .. | .. |
| Convalescent Stations and Depôt Hospitals .. | | 1,030 | 2,180 | 54 | 2,116 | 52·43 | .. | .. |

The ratio of admission was extremely high at Attock, Meean Meer, Jhansi, Peshawur, Allahabad, Chunar, Jullundur, Morar, Delhi and Rawul Pindee, and that of the deaths at Allahabad, Peshawur, Morar, and Umritsur. The ratio of deaths was also considerably above the average at many of the other stations.

The influence of the different classes of diseases in causing sickness and mortality in each of the military divisions, is shown in the following Tables :—



* Working parties during a portion of the year only.

| Order. | Military Divisions ... | Presidency. | | Allahabad. | | Oude. | | Sangor. | | Rohilcund. | | Gwalior. | | Meerut. | | Sirhind. | | Lahore. | | Peshawur. | | Jhelum. | | Troops on March and Detached. | | Convalescent Stations and Depôts. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Strength ... | 2,780 | | 3,575 | | 3,673 | | 1,720 | | 1,662 | | 1,736 | | 3,602 | | 4,254 | | 3,591 | | 2,821 | | 2,740 | | 1,254 | | 1,030 | |
| | Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| | *I. General Diseases.* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Febrile Group ... | 895 | 16 | 1,921 | 121 | 1,083 | 108 | 1,912 | 71 | 530 | 5 | 2,389 | 86 | 1,779 | 22 | 2,271 | 42 | 4,453 | 21 | 4,270 | 235 | 4,210 | 12 | 821 | 4 | 528 | 3 |
| 2 | Constitutional ,, ... | 502 | 5 | 990 | 4 | 499 | 15 | 279 | 6 | 272 | 6 | 390 | 2 | 596 | 7 | 868 | 11 | 389 | 8 | 291 | 6 | 326 | 6 | 247 | 9 | 422 | 8 |
| | *II. Local Diseases.* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Nervous System ... | 108 | 16 | 114 | 24 | 67 | 17 | 50 | 12 | 13 | 3 | 41 | 22 | 92 | 14 | 108 | 9 | 143 | 18 | 46 | 9 | 76 | 5 | 31 | 3 | 66 | 4 |
| 2 | Eye ... ... ... | 59 | ... | 100 | ... | 138 | ... | 47 | ... | 20 | .. | 48 | ... | 102 | ... | 133 | ... | 107 | ... | 45 | ... | 51 | ... | 30 | ... | 40 | ... |
| 3 | Ear ... ... ... | 28 | ... | 32 | ... | 21 | ... | 5 | ... | 7 | ... | 15 | ... | 27 | ... | 40 | ... | 38 | ... | 7 | ... | 8 | ... | 2 | ... | 2 | ... |
| 4 | Nose ... ... ... | 2 | ... | 3 | ... | 3 | ... | 7 | ... | ... | ... | 1 | ... | 4 | ... | 3 | ... | 4 | ... | 2 | ... | ... | ... | ... | ... | 5 | ... |
| 5 | Circulatory System ... | 27 | 5 | 50 | 5 | 35 | 4 | 16 | 4 | 18 | 4 | 17 | 6 | 41 | 3 | 40 | 4 | 75 | 5 | 55 | 4 | 76 | 5 | 6 | ... | 32 | 5 |
| 6 | Absorbent ,, ... | 33 | ... | 64 | ... | 28 | ... | 24 | ... | 34 | ... | 18 | ... | 37 | ... | 66 | ... | 22 | ... | 17 | ... | 28 | ... | 14 | ... | 16 | ... |
| 7 | Ductless Glands ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | 1 | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 8 | Respiratory System .. | 100 | 5 | 151 | 2 | 138 | 5 | 67 | 1 | 37 | 3 | 64 | ... | 193 | 3 | 318 | ... | 216 | 2 | 171 | 5 | 137 | ... | 53 | 4 | 60 | ... |
| 9 | Digestive ,, ... | 662 | 21 | 1,403 | 53 | 1,126 | 36 | 647 | 35 | 349 | 13 | 599 | 18 | 1,122 | 34 | 1,094 | 27 | 1,023 | 24 | 786 | 18 | 708 | 15 | 276 | 13 | 638 | 26 |
| 10 | Urinary ,, ... | 282 | 1 | 636 | 1 | 439 | 2 | 205 | ... | 237 | 1 | 319 | ... | 353 | 1 | 359 | 1 | 366 | 3 | 167 | 1 | 200 | 1 | 105 | 1 | 112 | 3 |
| 11 | Generative ,, ... | 37 | ... | 67 | ... | 60 | ... | 30 | ... | 30 | ... | 39 | ... | 69 | ... | 70 | ... | 44 | ... | 40 | ... | 42 | ... | 15 | ... | 24 | ... |
| 12 | Organs of Locomotion | 10 | ... | 27 | ... | 14 | ... | 8 | ... | 5 | ... | 9 | ... | 16 | ... | 23 | ... | 37 | ... | 26 | ... | 10 | ... | 3 | ... | 9 | 1 |
| 13 | Cellular Tissue ... | 39 | ... | 61 | ... | 65 | ... | 35 | ... | 24 | ... | 17 | ... | 56 | ... | 22 | ... | 50 | ... | 29 | 1 | 33 | ... | 6 | ... | 17 | ... |
| 14 | Cutaneous System ... | 196 | ... | 374 | ... | 273 | ... | 118 | ... | 75 | ... | 141 | ... | 305 | ... | 245 | ... | 438 | ... | 183 | ... | 233 | ... | 41 | ... | 92 | ... |
| | *III. Conditions, &c.* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Debility ... ... | 68 | ... | 88 | ... | 10 | ... | 19 | ... | 16 | ... | 20 | ... | 20 | 1 | 58 | ... | 62 | 2 | 29 | 1 | 63 | ... | 23 | 1 | 25 | ... |
| | *IV. Poisons* ... | 42 | 5 | 29 | 1 | 23 | 4 | 8 | ... | 6 | 1 | 11 | 3 | 31 | 5 | 34 | 2 | 23 | 2 | 10 | 1 | 21 | 2 | 1 | ... | 7 | ... |
| | *V. Injuries.* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Accidental ... ... | 267 | 8 | 349 | 2 | 282 | 1 | 142 | 1 | 64 | 1 | 203 | 1 | 386 | 2 | 415 | 2 | 352 | 2 | 229 | 1 | 293 | 1 | 85 | 3 | 81 | ... |
| 3 | Homicidal ... ... | ... | ... | ... | ... | ... | ... | 1 | 1 | ... | ... | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | 1 | 1 | ... | ... |
| 4 | Self-inflicted .. ... | 1 | 1 | ... | 8 | 1 | ... | ... | 3 | 2 | ... | ... | 1 | ... | 1 | ... | 3 | 2 | 1 | 1 | 2 | 1 | 2 | ... | 1 | ... | 1 |
| 5 | Judicial ... ... | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| | VI. *Surgical Operations* ... | ... | ... | 2 | ... | 1 | ... | ... | ... | ... | ... | ... | ... | 1 | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| | No appreciable disease | 4 | ... | ... | ... | 40 | ... | 4 | ... | 1 | ... | ... | ... | 3 | ... | 8 | ... | 1 | ... | 1 | ... | 5 | ... | ... | ... | 4 | ... |
| | Total ... ... | 3,352 | 83 | 6,462 | 222 | 4,346 | 192 | 3,624 | 134 | 1,740 | 37 | 4,342 | 139 | 5,233 | 94 | 6,176 | 101 | 7,846 | 88 | 6,405 | 284 | 6,521 | 49 | 1,760 | 40 | 2,180 | 54 |

## Ratio per 1,000 of Mean Strength.

| Order. | Military Divisions ... | Presidency. | | Allahabad. | | Oude. | | Saugor. | | Rohilcund. | | Gwalior. | | Meerut. | | Sirhind. | | Lahore. | | Peshawur. | | Jhelum. | | Troops on March, and Detached. | | Convalescent Stations and Depôts. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| | *General Diseases.* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Febrile Group ... | 318·4 | 5·76 | 537·4 | 33·85 | 295·0 | 29·41 | 1112·0 | 41·28 | 319·0 | 3·01 | 1376·1 | 49·54 | 494·0 | 6·11 | 534·0 | 9·87 | 1240·0 | 5·85 | 1514·0 | 83·31 | 1537·0 | 4·38 | 655·0 | 3·20 | 512·6 | 2·91 |
| 2 | Constitutional ,, ... | 180·6 | 1·80 | 276·9 | 1·12 | 136·0 | 4·08 | 162·2 | 3·49 | 163·7 | 3·61 | 224·7 | 1·15 | 165·5 | 1·94 | 204·0 | 2·59 | 108·3 | 2·23 | 103·2 | 2·13 | 119·0 | 2·19 | 197·0 | 7·18 | 410·0 | 7·77 |
| | *Local Diseases.* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Diseases of the— | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Nervous System ... | 38·9 | 5·76 | 31·9 | 6·72 | 18·2 | 4·63 | 29·1 | 6·93 | 7·8 | 1·81 | 23·6 | 12·67 | 25·6 | 3·88 | 25·4 | 2·12 | 39·8 | 5·01 | 16·3 | 3·19 | 27·7 | 1·83 | 24·7 | 2·39 | 64·1 | 3·88 |
| 2 | Eye ... ... ... | 21·2 | ... | 28·0 | ... | 27·6 | ... | 27·3 | ... | 12·0 | ... | 27·7 | ... | 28·3 | ... | 31·3 | ... | 29·8 | ... | 15·9 | ... | 18·6 | ... | 23·9 | ... | 38·8 | ... |
| 3 | Ear ... ... ... | 10·1 | ... | 9·0 | ... | 5·7 | ... | 2·9 | ... | 4·2 | ... | 8·6 | ... | 7·5 | ... | 9·4 | ... | 10·6 | ... | 2·4 | ... | 2·9 | ... | 1·5 | ... | 1·9 | ... |
| 4 | Nose ... ... ... | ·7 | ... | ·8 | ... | ·8 | ... | 4·0 | ... | ... | ... | ·5 | ... | 1·1 | ... | ·7 | ... | 1·1 | ... | ·7 | ... | ... | ... | ... | ... | 4·8 | ... |
| 5 | Circulatory System ... | 9·7 | 1·80 | 14·0 | 1·40 | 6·5 | 1·09 | 9·3 | 2·32 | 10·8 | 2·40 | 9·8 | 3·46 | 11·4 | ·83 | 9·4 | ·94 | 20·9 | 1·39 | 19·5 | 1·42 | 27·7 | 1·83 | 4·8 | ... | 31·1 | 4·85 |
| 6 | Absorbent ,, ... | 11·9 | ... | 18·0 | ... | 7·6 | ... | 14·0 | ... | 20·5 | ... | 10·4 | ... | 10·3 | ... | 15·5 | ... | 6·1 | ... | 6·0 | ... | 10·2 | ... | 11·1 | ... | 15·5 | ... |
| 7 | Ductless Glands ... | ... | ... | ·2 | ... | ... | ... | ... | ... | ... | ... | ·5 | ... | ... | ... | ·2 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 8 | Respiratory System ... | 36·0 | 1·80 | 42·2 | ·56 | 37·6 | 1·36 | 39·0 | ·58 | 22·3 | 1·81 | 36·9 | ... | 53·6 | ·83 | 74·7 | ... | 60·2 | ·56 | 60·6 | 1·77 | 50·0 | ... | 42·3 | 3·20 | 58·3 | 2·91 |
| 9 | Digestive ,, ... | 238·1 | 7·55 | 392·5 | 14·83 | 306·6 | 9·80 | 376·2 | 20·35 | 210·0 | 7·82 | 345·1 | 10·37 | 311·5 | 9·44 | 257·2 | 6·35 | 285·0 | 6·68 | 278·6 | 6·39 | 258·4 | 5·47 | 220·1 | 10·37 | 619·4 | 25·25 |
| 10 | Urinary ,, ... | 101·5 | ·35 | 177·9 | ·27 | 119·5 | ·54 | 119·2 | ... | 142·6 | ·60 | 183·8 | ... | 98·0 | ·28 | 84·4 | ·23 | 102·0 | ·83 | 59·2 | ·35 | 73·0 | ·36 | 83·7 | ·79 | 108·7 | 2·91 |
| 11 | Generative ,, ... | 13·3 | ... | 18·7 | ... | 16·3 | ... | 17·4 | ... | 18·0 | ... | 22·5 | ... | 19·2 | ... | 16·4 | ... | 12·3 | ... | 14·1 | ... | 15·3 | ... | 12·0 | ... | 23·3 | ... |
| 12 | Organs of Locomotion | 3·6 | ... | 7·6 | ... | 3·8 | ... | 4·6 | ... | 3·0 | ... | 5·2 | ... | 4·4 | ... | 5·4 | ... | 10·3 | ... | 9·2 | ... | 3·6 | ... | 2·4 | ... | 8·7 | ·97 |
| 13 | Cellular Tissue ... | 14·0 | ... | 17·1 | ... | 17·7 | ... | 20·3 | ... | 14·4 | ... | 9·8 | ... | 15·5 | ... | 5·2 | ... | 13·9 | ... | 10·3 | ·35 | 12·0 | ... | 4·8 | ... | 16·5 | ... |
| 14 | Cutaneous System ... | 70·5 | ... | 104·6 | ... | 74·3 | ... | 68·6 | ... | 45·1 | ... | 81·2 | ... | 84·7 | ... | 57·6 | ... | 122·0 | ... | 64·9 | ... | 85·0 | ... | 32·7 | ... | 89·3 | ... |
| | III. *Conditions, &c.* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Debility ... ... | 24·5 | ... | 24·6 | ... | 2·7 | ... | 11·0 | ... | 9·6 | ... | 11·5 | ... | 5·5 | ·28 | 13·6 | ... | 17·3 | ·56 | 10·3 | ·35 | 22·9 | ... | 18·3 | ·79 | 24·3 | ... |
| | IV. *Poisons* ... | 15·1 | 1·80 | 8·1 | ·27 | 6·3 | 1·09 | 4·6 | ... | 3·6 | ·60 | 6·3 | 1·73 | 8·6 | 1·39 | 8·0 | ·47 | 6·4 | ·56 | 3·5 | ·35 | 7·6 | ·73 | ·7 | ... | 6·8 | ... |
| | V. *Injuries.* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Accidental ... ... | 96·0 | 2·88 | 97·6 | ·56 | 76·8 | ·27 | 82·5 | ·58 | 38·5 | ·60 | 117·0 | ·57 | 107·2 | ·55 | 97·6 | ·47 | 98·0 | ·57 | 81·2 | ·35 | 106·9 | ·36 | 67·8 | 2·39 | 78·6 | ... |
| 3 | Homicidal ... ... | ... | ... | ... | ... | ... | .. | ·5 | ·58 | ... | ... | ... | ... | ... | ·28 | ... | ... | ... | ... | ... | ... | ... | ... | ·7 | ·79 | ... | ... |
| 4 | Self-Inflicted ... ... | ·3 | ·35 | ... | 2·24 | ·2 | ... | ... | 1·74 | 1·2 | ... | ... | ·57 | ... | ·28 | ... | ·70 | ·5 | ·26 | ·3 | ·71 | ·3 | ·73 | ... | ·79 | ... | ·97 |
| 5 | Judicial ... ... | ... | ... | ... | ·27 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| | VI. *Surgical Operations* | ... | ... | ·5 | ... | ·2 | ... | ... | ... | ... | ... | ... | ... | ·2 | ... | ... | ... | ·2 | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| | No appreciable Disease | 1·3 | ... | ... | ... | 10·8 | ... | 2·3 | ... | ·6 | ... | ... | ... | ·7 | .. | 1·8 | ... | ·2 | ... | ·3 | ... | 1·8 | ... | ... | ... | 3·8 | ... |
| | **Total ...** ... | 1205·7 | 29·85 | 1807·6 | 62·09 | 1183·2 | 52·27 | 2107·0 | 77·90 | 1046·9 | 22·26 | 2501·2 | 80·06 | 1452·8 | 26·09 | 1451·8 | 23·74 | 2184·9 | 24·50 | 2270·5 | 100·67 | 2379·9 | 17·88 | 1403·5 | 31·89 | 2116·5 | 52·42 |

## General Diseases.

| Military Divisions | Presidency. | | Allahabad. | | Oude. | | Saugor. | | Rohilcund. | | Gwalior. | | Meerut. | | Sirhind. | | Lahore. | | Peshawur. | | Jhelum. | | On the March. | | Depôts. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Strength | 2,780 | | 3,575 | | 3,673 | | 1,720 | | 1,662 | | 1,736 | | 3,602 | | 4,254 | | 3,591 | | 2,821 | | 2,740 | | 1,254 | | 1,030 | |
| General Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| *Febrile—* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Eruptive Fevers | 4 | ... | 18 | 1 | 12 | 3 | 28 | 4 | 1 | ... | 10 | ... | 30 | 3 | 3 | 1 | 24 | 2 | ... | ... | ... | ... | 5 | ... | ... | ... |
| Continued ,, | 246 | 3 | 771 | 8 | 603 | 11 | 32 | ... | 106 | 2 | 416 | 6 | 404 | 5 | 254 | 9 | 698 | 7 | 1,761 | 10 | 1,444 | 4 | 134 | 3 | 98 | 3 |
| Paroxysmal ,, | 625 | 7 | 965 | 14 | 353 | 11 | 1,781 | 19 | 419 | 3 | 1,798 | 5 | 1,318 | 5 | 1,958 | 15 | 3,694 | 6 | 2,191 | 10 | 2,761 | 7 | 678 | ... | 417 | ... |
| Malignant Cholera | 4 | 4 | 148 | 97 | 106 | 83 | 70 | 47 | ... | ... | 159 | 75 | 13 | 9 | 28 | 17 | 9 | 6 | 309 | 212 | ... | ... | 1 | 1 | 4 | 2 |
| Influenza | 4 | ... | 8 | ... | 5 | ... | ... | ... | 1 | ... | 1 | ... | 11 | ... | 20 | ... | 17 | ... | 1 | ... | ... | ... | 1 | ... | 5 | ... |
| Erysipelas | 2 | ... | 7 | 1 | 3 | ... | 1 | 1 | 2 | ... | 5 | ... | 3 | ... | 7 | ... | 11 | ... | 3 | 1 | 3 | ... | 2 | ... | 4 | ... |
| Other Diseases of this group | ... | ... | 4 | ... | 1 | ... | ... | ... | 1 | ... | ... | ... | ... | ... | 1 | ... | ... | ... | 5 | 2 | 2 | 1 | ... | ... | ... | ... |
| *Constitutional—* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rheumatism | 118 | ... | 180 | ... | 194 | 1 | 66 | ... | 33 | ... | 80 | ... | 186 | ... | 360 | ... | 167 | ... | 114 | 1 | 128 | ... | 66 | ... | 135 | .. |
| Syphilis | 328 | 1 | 704 | ... | 229 | ... | 175 | ... | 215 | 1 | 236 | ... | 296 | 1 | 402 | ... | 175 | ... | 123 | 1 | 152 | ... | 149 | ... | 184 | ... |
| Scrofula, Phthisis, &c. | 43 | 4 | 33 | 4 | 58 | 13 | 22 | 5 | 20 | 5 | 16 | ... | 64 | 6 | 91 | 11 | 22 | 8 | 31 | 4 | 20 | 5 | 19 | 7 | 80 | 8 |
| Scurvy and Purpura | 5 | ... | 2 | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | 1 | ... | 8 | ... | 3 | ... | 3 | ... | ... | ... | 3 | ... |
| Anæmia | 6 | ... | 68 | ... | 11 | ... | 9 | 1 | 3 | ... | 54 | 1 | 50 | ... | 13 | ... | 14 | ... | 16 | ... | 21 | 1 | 12 | 1 | 20 | ... |
| Other Diseases by this Group | 2 | ... | 3 | ... | 7 | 1 | 6 | ... | 1 | ... | 4 | 1 | ... | ... | 1 | ... | 3 | ... | 4 | ... | 2 | ... | 1 | 1 | ... | ... |

Ratio per 1,000 of Mean Strength.

| Units or Divisions | Presidency. | | Allahabad. | | Oude. | | Saugor. | | Rohilcund. | | Gwalior. | | Meerut. | | Sirhind. | | Lahore. | | Peshawur | | Jhelum. | | On the March. | | Depôts. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| General Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| *Febrile—* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Eruptive Fevers ... ... | 1·4 | ... | 5·0 | ·28 | 3·3 | ·82 | 16·2 | 2·32 | ·6 | ... | 5·8 | ... | 8·3 | ·83 | ·7 | ·23 | 6·7 | ·56 | ... | ... | ... | ... | 4·0 | ... | ... | ... |
| Continued ,, ... ... | 88·5 | 1·08 | 215·7 | 2·23 | 164·1 | 2·99 | 18·6 | ... | 63·9 | 1·21 | 239·6 | 3·46 | 112·2 | 1·39 | 59·7 | 2·11 | 194·3 | 1·95 | 624·2 | 3·54 | 527·0 | 1·46 | 106·8 | 2·39 | 95·1 | 2·91 |
| Paroxysmal ,, ... ... | 224·8 | 2·52 | 269·9 | 3·92 | 96·1 | 2·99 | 1035·5 | 11·04 | 252·4 | 1·81 | 1035·7 | 2·87 | 365·9 | 1·39 | 460·3 | 3·53 | 1028·7 | 1·67 | 776·7 | 3·54 | 1007·7 | 2·55 | 540·7 | ... | 404·8 | ... |
| Malignant Cholera ... ... | 1·4 | 1·44 | 41·4 | 27·13 | 28·9 | 22·65 | 40·7 | 27·32 | ... | ... | 91·6 | 43·20 | 3·6 | 2·56 | 6·6 | 4·00 | 2·5 | 1·67 | 109·5 | 75·15 | ... | ... | ·8 | ·80 | 3·9 | 1·94 |
| Influenza ... ... ... | 1·4 | ... | 2·2 | ... | 1·4 | ... | ... | ... | ·6 | ... | ·6 | ... | 3·1 | ... | 4·7 | ... | 4·8 | ... | ·4 | ... | ... | ... | ·8 | ... | 4·9 | ... |
| Erysipelas ... ... ... | ·7 | ... | 2·0 | ·28 | ·8 | ... | ·6 | ·58 | 1·2 | ... | 2·9 | ... | ·8 | ... | 1·7 | ... | 3·1 | ... | 1·1 | ·36 | 1·1 | ... | 1·6 | ... | 3·9 | ... |
| Other Diseases ... ... | ... | ... | 1·1 | ... | ·3 | ... | ... | ... | ·6 | ... | ... | ... | ... | ... | ·2 | ... | ... | ... | 1·8 | ·71 | ·7 | ·37 | ... | ... | ... | ... |
| *Constitutional—* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rheumatism ... ... ... | 42·4 | ... | 50·4 | ... | 52·8 | ·27 | 38·3 | ... | 19·9 | ... | 46·1 | ... | 51·6 | ... | 84·6 | ... | 46·5 | ... | 40·4 | ·36 | 46·7 | ... | 52·6 | ... | 131·1 | ... |
| Syphilis ... ... ... | 118·0 | ·36 | 196·9 | ... | 62·4 | ... | 101·8 | ... | 129·5 | ·60 | 135·9 | ... | 82·2 | ·28 | 94·5 | ... | 48·7 | ... | 43·6 | ·36 | 55·5 | ... | 118·8 | ... | 178·6 | ... |
| Scrofula, Phthisis, &c. ... | 15·5 | 1·44 | 9·2 | 1·12 | 15·8 | 3·54 | 12·8 | 2·90 | 12·1 | 3·02 | 9·2 | ... | 17·8 | 1·66 | 21·4 | 2·59 | 6·1 | 2·22 | 11·0 | 1·41 | 7· | 1·82 | 15·2 | 5·58 | 77·7 | 7·77 |
| Scurvy and Purpura ... | 1·8 | ... | ·6 | ... | ... | ... | ·6 | ... | ... | ... | ... | ... | ... | ... | ·2 | ... | 2·2 | ... | 1·1 | ... | 1·1 | ... | ... | ... | 2·9 | ... |
| Anæmia ... ... ... | 2·2 | ... | 19·0 | ... | 3·0 | ... | 5·2 | 5·8 | 1·8 | ... | 31·1 | ·58 | 13·9 | ... | 3·1 | ... | 3·9 | ... | 5·7 | ... | 7·7 | ·37 | 9·6 | ·80 | 19·4 | ... |
| Other Diseases ... ... | ·7 | ... | ·8 | ... | 1·9 | ·27 | 3·5 | ... | ·6 | ... | 2·3 | ·58 | ... | ... | ·2 | ... | ·9 | ... | 1·4 | ... | ·7 | ... | ·8 | ·80 | ... | ... |

GENERAL DISEASES.—The *febrile group* of this class gave rise to a very high ratio of sickness in the Jhelum, Peshawur, Gwalior, and Saugor Divisions, the admissions in all of these having exceeded the strength. The ratio of deaths by them was also extremely high in the Peshawur, Gwalior, and Saugor Divisions, and was considerably above the average in the Allahabad and Oude.

*Eruptive Fevers* were greatly in excess as regards both prevalence and mortality in the Saugor Division, and the ratio of admissions was also above the average in the Lahore, Gwalior and Allahabad Divisions. The excess was entirely due to the prevalence of small pox, chiefly in the first and, though to a less extent, also in the second quarter of the year. At Saugor 28 cases and 5 deaths occurred; at Agra 20 and 12 deaths; at Lucknow 11 and 2; at Ferozepore 11 cases; at Mean Meer 8 and 2 deaths, and at Allahabad 8 cases and 1 death. The proportion of deaths to cases was high, having been 1 in 9. There were only 6 cases of eruptive fevers besides those of small pox, 3 of measles and three of scarlet fever.

*Continued Fevers* were more prevalent than in 1868 in all the Divisions except the Presidency, Saugor, and Sirhind, in which there was a reduction. The ratio of admissions was extremely high in the Peshawur and Jhelum Divisions. In the former continued fever prevailed as an epidemic at Peshawur between April and October; the 104th Regiment suffered most, having had 830 cases and 4 deaths during the year in a strength of 683 men; the 36th Regiment had 474 cases and 1 death in a strength of 727, and the Royal Artillery 339 cases and 2 deaths in 485 men. In the Jhelum Division continued fevers were very rife in the 1st Battalion 19th Regiment at Rawul Pindee from August to November, and in the 1st Battalion 6th Regiment from May till September; the former had 563 cases and 2 deaths during the year in a mean strength of 807, and the latter 398 cases and 3 deaths in a strength of 831 men; both corps had been on field service in 1868 in the Hazara country. The causes assigned for the great prevalence of continued fevers were the prolonged and unusual heat and scanty rainfall. The 5th Regiment at Ferozepore, the 103rd at Morar, the 62nd at Lucknow, and the 38th at Sealkote also furnished a high proportion of cases.

*Paroxysmal Fevers* were more prevalent than in 1868 in all the Divisions except the Presidency, Allahabad, Oude and Sirhind. The excess was very great in the Saugor, Gwalior, Lahore and Jhelum Divisions, in all of which the admissions during the year exceeded the mean strength. The ratio was very high also in the Peshawur District, the admissions amounting to three-fourths of the strength. Oude was the Division which furnished the lowest ratio of cases. The excessive prevalence of these fevers was from September till December.

The following Table shows the stations at which paroxysmal fevers were most prevalent and the corps which suffered from them to an unusual extent. It has been prepared from the Sanitary Reports and includes only such portions of the corps as were at the stations, omitting working parties and detachments at the convalescent depôts:—

*Bengal*, 1869.

| Division or District. | Station. | Corps. | Average Annual Strength. | Admissions by Paroxysmal Fevers. | Deaths by Paroxysmal Fevers. | Strength. | Admissions by Paroxysmal Fevers. |
|---|---|---|---|---|---|---|---|
| Allahabad .. | Allahabad .. | 58th Regiment.. | 661 | 491 | 7 | 661 | 491 |
| Saugor | Saugor .. | E, 16th R.A. .. | 142 | 129 | .. | 967 | 948 |
| | | 6, 22nd, R.A. .. | 72 | 59 | .. | | |
| | | 1st Bn., 7th Regt. | 753 | 760 | 9 | | |
| | Jubbulpore | G, 16th R.A. .. | 122 | 104 | 1 | 646 | 797 |
| | | 2nd Bn., 12th Regt | 524 | 693 | 5 | | |
| Gwalior | Jhansi .. | A, 19th R.A. .. | 136 | 163 | .. | 696 | 1,090 |
| | | 93rd Regiment.. | 447 | 833 | 2 | | |
| | Seepree .. | „ „ | 113 | 94 | .. | | |
| | Morar .. | C, 8th R.A. .. | 116 | 73 | 1 | 590 | 624 |
| | | 103rd Regiment | 474 | 551 | 1 | | |
| Meerut | Delhi .. | 2, 25th R.A. .. | 50 | 73 | .. | 357 | 439 |
| | | R. Wing, 79th Rt. | 307 | 366 | .. | | |
| | Roorkee .. | Head-Qrs., „ | 354 | 446 | 1 | 354 | 446 |
| Sirhind | Umballa .. | 21st Hussars .. | 380 | 155 | .. | 646 | 318 |
| | | A, F, R.H.A. .. | 139 | 81 | .. | | |
| | | E, „ „ .. | 127 | 82 | .. | | |
| | Jullundur .. | 92nd Regiment.. | 644 | 1,025 | 4 | 644 | 1,025 |
| Lahore | Meean Meer | F, F, R H.A. .. | 121 | 118 | .. | 1,007 | 2,293 |
| | | F, 19th R.A. .. | 129 | 168 | .. | | |
| | | 5, 22nd „ .. | 65 | 82 | .. | | |
| | | 5, 24th „ .. | 71 | 66 | 1 | | |
| | | 85th Regiment.. | 621 | 1,859 | 1 | | |
| | Mooltan .. | D, 19th R.A. .. | 141 | 123 | .. | 939 | 857 |
| | | 1, 24th „ .. | 77 | 41 | .. | | |
| | | 109th Regiment | 721 | 688 | 2 | | |
| Peshawur | Peshawur .. | B, A, R.H.A. .. | 135 | 164 | 1 | 1,737 | 1,829 |
| | | E, „ „ .. | 131 | 162 | .. | | |
| | | B, 19th R.A. .. | 129 | 84 | .. | | |
| | | 4, 22nd „ .. | 65 | 41 | .. | | |
| | | 36th Regiment.. | 654 | 935 | 9 | | |
| | | 104th „ .. | 623 | 443 | 3 | | |
| | Nowshera .. | 88th „ .. | 498 | 673 | 2 | 498 | 673 |
| Jhelum | Rawul Pindee | D, F, R.H.A. .. | 140 | 220 | 1 | 1,603 | 1,761 |
| | | E, 19th R.A. .. | 126 | 256 | .. | | |
| | | 1st Bn., 6th Regt. | 623 | 736 | 3 | | |
| | | 1st Bn., 19th „ | 614 | 549 | 1 | | |
| | Attock .. | 4, 25th R.A. .. | 77 | 140 | .. | 77 | 140 |

This Table shows an enormously high proportion of admissions at Meean Meer, where the 85th Regiment had three cases for each man serving. The 92nd at Jullundur, the 93rd at Jhansi, the 36th at Peshawur, the 88th at Nowshera, the two Batteries of Artillery and the 1st Battalion 6th Regiment at Rawul Pindee, and the 4th Battery 25th Brigade Royal Artillery at Attock had also a very large number of admissions.

*Cholera*, as already stated, caused nearly two-thirds of the total mortality

of the year. It did not prevail equally over the whole of the Command. So far as regards the European troops two of the Divisions, Rohilcund and Jhelum, escaped it altogether, and in four, the Presidency, Meerut, Lahore, and Sirhind, it did not prevail to any marked extent, while in the other five it raged as an epidemic, but particularly in the Peshawur District.

In the Allahabad Division the first case among the European troops occurred in the 58th Regiment at Allahabad on the 22nd March, and the disease continued to prevail in it till the middle of August, with the exception of the period between 9th June and 22nd July. There were 104 cases and 73 deaths in the regiment. The Royal Artillery at the station were not affected till the middle of July, after which the two batteries had 10 cases and 8 deaths. At Cawnpore in the same Division cholera broke out on the 20th July in the 1st Battalion 14th Regiment, 15 cases and 8 deaths occurring in it. 3 fatal cases in the battery of Artillery, and 1 fatal case in the left wing of the 19th Hussars.

In the Oude Division 8 cases and 4 deaths occurred in the 2nd Battalion 60th Regiment at Seetapore in the end of April and beginning of May. The disease broke out as an epidemic among the troops at Lucknow on the 28th July, and continued to prevail till the end of August. The 62nd Regiment had 53 cases and 41 deaths, the 102nd had 13 cases and 11 deaths, the 5th Lancers 5 cases and 4 deaths, and the 3rd Battery 24th Brigade Royal Artillery, 2 fatal cases. At Fyzabad, between 6th August and 9th September, there were 21 cases with 15 deaths in the 1st Battalion 11th Regiment, and 2 fatal cases in the battery of Artillery.

In the Saugor District the first case among the troops occurred on the 1st April at Jubbulpore in the 12th Regiment, and the disease prevailed in the District till the end of August. The Head-Quarters 2nd Battalion 12th Regiment at Jubbulpore had 11 cases with 9 deaths, and the battery of Artillery at the same station 2 fatal cases. The left wing of the 12th at Nowgong had 6 cases and 4 deaths. At Saugor there were 6 cases with 5 deaths in the two batteries Royal Artillery, and the 1st Battalion 7th Regiment had 45 cases and 27 deaths.

In the Morar District the disease prevailed as an epidemic among the troops from the 20th April till 15th October, with an intermission from the middle of June till August. At Morar and Fortress Gwalior the four batteries of Artillery had 60 cases with 32 deaths, and the 103rd Regiment 54 cases and 33 deaths At Jhansi and Seepree the 93rd Regiment had 11 cases with 5 deaths, and the battery of Artillery at Jhansi 1 fatal case.

The Peshawur District had a higher ratio both of admissions and deaths than any Division or District in the Command, and, with the exception of 2 fatal cases in the 88th at Nowshera, they all occurred at Peshawur and in the cholera camps of the troops from that station. The four batteries of Royal Artillery furnished 40 cases with 31 deaths; the 36th Regiment 180 cases with 112 deaths, and the 104th Regiment 102 cases and 66 deaths.

In the Sirhind Division a sharp outbreak of cholera occurred in the 41st Regiment at Subathoo on the 5th August and terminated on 5th September, in which time 24 cases and 16 deaths occurred. The disease is stated not to have been epidemic among the native population at the time.

Such were the stations at which cholera prevailed as an epidemic during the year. At almost all of them it made its appearance among the native population before it attacked the European troops.

With a view to ascertain the influence of age on the mortality by cholera during a severe epidemic, the following Table has been prepared, showing the deaths at each age by that disease at the stations where it prevailed epidemically. Care has been taken to exclude men who were detached from their corps and who died from cholera at stations where it did not prevail as an epidemic. All corps also have been omitted from the strength in which no fatal case of cholera occurred, although they were serving at one of the affected stations.

| Stations. | Under 20. | | 20 and under 25. | | 25 and under 30. | | 30 and under 35. | | 35 and under 40. | | 40 and upwards. | | Total. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Strength on 1st January. | Died of Cholera. | Strength on 1st January. | Died of Cholera. | Strength on 1st January. | Died of Cholera. | Strength on 1st January. | Died of Cholera. | Strength on 1st January. | Died of Cholera. | Strength on 1st January. | Died of Cholera. | Strength on 1st January. | Died of Cholera. |
| Allahabad .. .. .. | 153 | 5 | 262 | 21 | 294 | 29 | 128 | 17 | 51 | 8 | 6 | 2 | 894 | 82 |
| Cawnpore .. .. .. | 120 | .. | 327 | 4 | 247 | .. | 279 | 6 | 99 | 1 | 18 | 1 | 1,090 | 12 |
| Lucknow .. .. .. | 250 | 4 | 599 | 23 | 668 | 14 | 572 | 8 | 126 | 8 | 45 | 2 | 2,260 | 59 |
| Fyzabad .. .. .. .. | 147 | .. | 355 | 6 | 229 | 4 | 125 | 2 | 81 | 1 | 6 | 1 | 943 | 14 |
| Saugor .. .. .. .. | 173 | 1 | 181 | 13 | 367 | 12 | 306 | 5 | 67 | 1 | 10 | .. | 1,104 | 32 |
| Jubbulpore and Nowgong .. | 36 | .. | 323 | 6 | 349 | 7 | 140 | 1 | 48 | 1 | 4 | .. | 900 | 15 |
| Morar and Fort Gwalior .. | 93 | 1 | 349 | 10 | 323 | 25 | 301 | 19 | 104 | 7 | 16 | 4 | 1,186 | 66 |
| Subathoo.. .. .. .. | 43 | 1 | 333 | 8 | 221 | 5 | 185 | 1 | 49 | 1 | 17 | .. | 848 | 16 |
| Peshawur .. .. .. | 78 | 5 | 393 | 45 | 617 | 65 | 616 | 77 | 216 | 14 | 32 | 4 | 1,952 | 210 |
| Total .. .. .. | 1,093 | 17 | 3,122 | 136 | 3,315 | 161 | 2,652 | 136 | 841 | 42 | 154 | 14 | 11,177 | 506 |
| Ratio per 1,000 of Strength .. | 15·55 | | 43·56 | | 43·56 | | 51·28 | | 49·94 | | 90·91 | | 45·27 | |

This Table shows an exemption under 20 years of age; at the two next quinquennial periods the ratio was identical; the next two were nearly identical, but show a moderate increase upon the ratio of the preceding decennium, and the numbers above 40 were too small to justify any deductions. It cannot be said therefore that there was a marked liability to mortality by this disease at any age, but the ratio does not show the same increase with the advance of life which is characteristic of the mortality by the ordinary classes of diseases in tropical climates.

*Rheumatism* did not materially differ from the results of the preceding year except in the Rohilcund Division, where the troops enjoyed a marked exemption from it, and in the Sirhind Division, where the ratio of admissions was unusually high, the excess occurring chiefly in the 1st Battalion 3rd Foot at Dugshai.

*Syphilis* was above the average of the Command in five of the divisions (Allahabad, Gwalior, Rohilcund, Presidency and Saugor), was much below it in five (Oude, Meerut, Lahore, Peshawur, and Jhelum); and in Sirhind the ratio differed very slightly from the average. The prevalence of this disease in the different divisions in 1868 and 1869 respectively is shown in the following Table:—

ADMISSIONS by Syphilis per 1,000 of Mean Strength.

| Divisions. | 1869. | 1868.* | Divisions. | 1869. | 1868. |
|---|---|---|---|---|---|
| Allahabad .. .. | 196·9 | 165·4 | Meerut .. .. | 82·2 | 63·0 |
| Gwalior .. .. | 135·9 | 78·3 | Oude .. .. .. | 62·4 | 87·9 |
| Rohilcund .. .. | 129·5 | 104·3 | Jhelum .. .. | 55·5 | 40·4 |
| Presidency .. .. | 118·0 | 152·2 | Lahore .. .. | 48·7 | 51·1 |
| Saugor .. .. | 101·8 | 78·3 | Peshawur .. .. | 43·6 | 79·9 |
| Sirhind .. .. | 94·5 | 32·3 | | | |

Compared with the results for 1868 there was an increase in the prevalence of syphilis in 1869 in all the Divisions, except the Presidency, Oude, Lahore, and Peshawur. The increase was most marked in the Sirhind and Gwalior Divisions, but was also considerable in the Allahabad, Rohilcund, and Saugor. In the Allahabad Division the excess was chiefly in the 1st Battalion 14th Regiment at Cawnpore; in the Gwalior it was most marked in the Royal Artillery and 93rd Regiment at Jhansi, and to a less extent in the 103rd at Morar; in Rohilcund the 2nd Battalion 25th Regiment at Bareilly, and in Meerut the 77th at Agra and the detachment 105th at Futtyghur furnished a very large proportion of cases. In Sirhind the disease was more prevalent than in 1868 at all the stations, the 41st Regiment at Subathoo and the 1st Battalion 3rd Foot at Umballa, and afterwards at Dugshai, contributing greatly to the excess.

*Scrofula and Phthisis* gave rise to an unusually high ratio of admissions in the Sirhind, and of deaths in the Oude Division. The excess in the former was due to the large number of cases in the 41st Regiment at Subathoo, 51, or upwards of half the admissions by these diseases in the Division, having occurred in it—a circumstance which the medical officer attributes "to the change from the hot and dry climate of Agra to the cold and damp one of Subathoo. Of the 13 deaths in the Oude Division six occurred in the 102nd Regiment at Lucknow, but this may probably have been an accidental fluctuation, the result of the smallness of the numbers.

DISEASES OF THE NERVOUS SYSTEM were much above the average in the Presidency and Lahore Divisions. The excess in the former was to a considerable extent due to a large number of admissions by epilepsy in the 1st Battery 25th Brigade Royal Artillery at Darjeeling, and also to a number

* Considerable alterations were made in the Divisions in 1869. For the purpose of an accurate comparison of the results of the two years, the Stations have been re-arranged for 1868, and included in the same Divisions to which they were transferred in the following year.

*Bengal*, 1869.

of cases of neuralgia throughout the Division, probably the result of malaria. In the Lahore Division the 85th Regiment at Meean Meer had also a large number of cases of neuralgia. The admissions by this class of diseases was very low in the Rohilcund Division, and was also considerably under the average in the Peshawur and Oude Divisions. The mortality was extremely high in the Gwalior Division, chiefly from the occurrence of 16 deaths from sunstroke. Of these, 13 took place at Morar and Fort Gwalior, nine in the 103rd Regiment and four in the Artillery. The ratio was high also in the Saugor, Allahabad, Presidency and Lahore Divisions, principally from deaths by heat apoplexy. The 62nd Regiment at Lucknow had 10 deaths and the 58th at Allahabad 7 from that cause.

*Diseases of the Eyes* did not differ greatly in amount from the results of the preceding year, except in the Oude Division where there was a considerable increase, and the Rohilcund Division, in which the ratio of admissions was very low. At none of the stations did ophthalmia prevail as an epidemic among the troops.

*Diseases of the Circulatory System* show a decrease in the admissions in all the Divisions except Lahore and Peshawur, in which there was an increase, and Sirhind, where the ratio in the two years was identical. The mortality, however was higher than in 1868 in all the Divisions except Allahabad, Oude and Meerut. There was a small apparent decrease in the Peshawur District, but this was a result of the transfer from it to the Jhelum Division of several of the stations at which the mortality by these diseases was higher than at Peshawur and Attock. The ratio of deaths by this class of diseases was very slightly higher in the Artillery than in the Cavalry or Infantry.

*Diseases of the Respiratory System.*—The ratio of admissions and deaths throughout the Command was almost identical with that of the preceding year. There was a marked reduction in the Presidency, Sirhind, Meerut, and Lahore Divisions, in which the ratio had been unusually high in 1868, and there was an increase on the very low ratio of the Rohilcund Division and also in the Meerut and Peshawur Divisions, but there was no special prevalence of any disease.

*Diseases of the Digestive System* have given rise to a higher ratio of admissions and deaths than any other class except the febrile group of general diseases. The admissions and deaths were above the average in the Allahabad, Saugor, and Gwalior Divisions, and the admissions also in the Oude and Meerut; they were below the average in all the other Divisions. The excess of cases was the greatest in the Allahabad, and of deaths in the Saugor Division. The lowest ratio of admissions was in the Rohilcund, and of deaths in the Jhelum Division, but even the latter was as high as $5\frac{1}{2}$ per 1,000 of the strength. Diarrhœa was very prevalent at Saugor, Lucknow, and Peshawur, and hepatitis at Saugor, Meerut, and Lucknow.

*Diseases of the Urinary System* were greatly above the average in the Allahabad and Gwalior Divisions, and were high also in Rohilcund. The excess in all was due to Gonorrhœa and its consequences.

*Diseases of the Cutaneous System* furnished a very high ratio of admissions in the Allahabad and Lahore Divisions, chiefly from ulcers and boils; in Lahore the excess occurred principally in the 109th Regiment at Mooltan.

The other classes of diseases do not seem to require special notice.

The admissions into hospital and deaths in each corps serving in the Command during the year are shown in the following Table :—

| Regiments. | Average Annual Strength. | Admitted into Hospital. | Deaths. | | | Annual Ratio per 1,000. | | Stations during the Year. | |
|---|---|---|---|---|---|---|---|---|---|
| | | | In India. | Of Invalids. | Total. | Admitted. | Died. | | months. |
| CAVALRY. | | | | | | | | | |
| 4th Hussars .. | 457 | 688 | 12 | 1 | 13 | 1505·5 | 28·45 | Meerut | 12 |
| 5th Lancers .. | 478 | 310 | 11 | .. | 11 | 648·5 | 23·01 | Lucknow | 11 |
| | | | | | | | | On march | 1 |
| 7th Hussars .. | 444 | 629 | 9 | 1 | 10 | 1416·7 | 22·52 | Sealkote | 12 |
| 11th „ .. | 454 | 502 | 5 | .. | 5 | 1105·7 | 11·01 | Muttra | 12 |
| 19th „ Rt. Wing | 242 | 329 | 8 | .. | 8 | 1359·5 | 33·06 | Benares | 12 |
| „ „ Left „ | 165 | 249 | 6 | .. | 6 | 1509·1 | 36·36 | Cawnpore | 12 |
| 20th „ .. | 454 | 482 | 10 | .. | 10 | 1061·2 | 22·03 | Campbellpore | 12 |
| | | | | | | | | Umballa | 10 |
| 21st „ .. | 411 | 618 | 5 | 1 | 6 | 1503·6 | 14·60 | On march | 1½ |
| | | | | | | | | Lucknow | ½ |
| Total Cavalry .. | 3,105 | 3,807 | 66 | 3 | 69 | 1226·9 | 22·22 | | |
| ROYAL ARTILLERY. | | | | | | | | | Patr. |
| | | | | | | | | A, Meerut | 9 |
| | | | | | | | | „ On march | $\frac{1}{12}$ |
| | | | | | | | | „ Umballa | $\frac{1}{12}$ |
| | | | | | | | | „ On march | $2\frac{1}{12}$ |
| | | | | | | | | B, Peshawur | 12 |
| A Brigade R.H.A. | 662 | 1,227 | 29 | .. | 29 | 1853·5 | 43·81 | C, Lucknow | 11½ |
| | | | | | | | | „ On march | ½ |
| | | | | | | | | D, Meerut | 10 |
| | | | | | | | | „ On march | ½ |
| | | | | | | | | „ Umballa | 1 |
| | | | | | | | | „ On march | ½ |
| | | | | | | | | E, Peshawur | 12 |
| C „ „ | 134 | 228 | 3 | .. | 3 | 1701·5 | 22·39 | F, Benares | $11\frac{11}{12}$ |
| | | | | | | | | „ On march | $\frac{1}{12}$ |
| | | | | | | | | A, Umballa | $9\frac{11}{12}$ |
| | | | | | | | | „ On march | 2. |
| | | | | | | | | „ Benares | $\frac{1}{12}$ |
| | | | | | | | | B, Sealkote | $9\frac{11}{12}$ |
| | | | | | | | | „ On march | $2\frac{1}{12}$ |
| | | | | | | | | C, Seepree | $1\frac{11}{12}$ |
| F „ „ | 330 | 1,709 | 36 | 3 | 39 | 2059·0 | 46·99 | „ On march | $\frac{1}{12}$ |
| | | | | | | | | „ Morar | 8½ |
| | | | | | | | | „ On march | 1 |
| | | | | | | | | „ Lucknow | ½ |
| | | | | | | | | D, Rawul Pindee | 12 |
| | | | | | | | | E, Umballa | 12 |
| | | | | | | | | F, Meean Meer | 12 |
| | | | | | | | | B, Lucknow | 10 |
| | | | | | | | | „ On march | 1½ |
| | | | | | | | | „ Dinapore | ½ |
| | | | | | | | | C, Gwalior | 12 |
| 8th „ R.A. | 966 | 1,412 | 53 | 2 | 55 | 1461·7 | 56·94 | D, Pareilly | 12 |
| | | | | | | | | E, Fyzabad | 12 |
| | | | | | | | | F, Sectapore | 12 |
| | | | | | | | | G, Cawnpore | 12 |
| | | | | | | | | H, Agra | 11 |
| | | | | | | | | „ On march | 1 |

*Bengal*, 1869.

| Regiments. | Average Annual Strength. | Admitted into Hospital. | Deaths. In India. | Deaths. Of Invalids. | Deaths. Total. | Annual ratio per 1,000. Admitted. | Annual ratio per 1,000. Died. | Stations during the Year. Batt. | months. |
|---|---|---|---|---|---|---|---|---|---|
| RL. ARTILLERY—*continued.* | | | | | | | | | |
| 16th Brigade, R.A. | 1,002 | 1,716 | 51 | 3 | 54 | 1712·6 | 53·89 | A, On march | 1 |
| | | | | | | | | „ Barrackpore | 11 |
| | | | | | | | | B, Meerut | 10 |
| | | | | | | | | „ On march | 2 |
| | | | | | | | | C, Barrackpore | 12 |
| | | | | | | | | D, On march | $\frac{2}{3}$ |
| | | | | | | | | „ Allahabad | $11\frac{1}{3}$ |
| | | | | | | | | E, Saugor | 12 |
| | | | | | | | | F, Dinapore | $11\frac{1}{2}$ |
| | | | | | | | | „ On march | $\frac{1}{2}$ |
| | | | | | | | | G, Jubbulpore | 12 |
| 19th „ „ | 989 | 2,275. | 44 | 1 | 45 | 2300·3 | 45·50 | A, Jhansi | 12 |
| | | | | | | | | B, Peshawur | 12 |
| | | | | | | | | C, Meerut | $10\frac{1}{2}$ |
| | | | | | | | | „ On march | $1\frac{1}{2}$ |
| | | | | | | | | D, Mooltan | 12 |
| | | | | | | | | E, Rawul Pindee | 12 |
| | | | | | | | | F, Meean Meer | $10\frac{1}{2}$ |
| | | | | | | | | „ On march | $1\frac{1}{2}$ |
| | | | | | | | | G, Jullundur | 12 |
| 22nd „ „ | 593 | 1,127 | 25 | 1 | 26 | 1900·5 | 43·84 | A, Allahabad | $\frac{1}{2}$ |
| | | | | | | | | „ Umballa | 3 |
| | | | | | | | | „ On march | $\frac{1}{2}$ |
| | | | | | | | | „ Jutogh | $6\frac{2}{3}$ |
| | | | | | | | | „ Umballa | $1\frac{1}{3}$ |
| | | | | | | | | B, Ferozepore | 12 |
| | | | | | | | | No. 3, Calcutta | 12 |
| | | | | | | | | „ 4, Peshawur | $11\frac{1}{3}$ |
| | | | | | | | | „ On march | $\frac{2}{3}$ |
| | | | | | | | | No. 5, on march | $1\frac{2}{3}$ |
| | | | | | | | | „ Meean Meer | $10\frac{1}{3}$ |
| | | | | | | | | No. 6, on march | 1 |
| | | | | | | | | „ Saugor | 11 |
| | | | | | | | | No. 7, Agra | 12 |
| 24th „ „ | 429 | 881 | 35 | .. | 35 | 1937·1 | 81·58 | No. 1, Mooltan | $11\frac{1}{3}$ |
| | | | | | | | | „ Delhi | $\frac{2}{3}$ |
| | | | | | | | | No. 2, Meean Meer | $\frac{1}{2}$ |
| | | | | | | | | „ On march | 1 |
| | | | | | | | | „ Morar | 1 |
| | | | | | | | | „ F. Gwalior | $9\frac{1}{2}$ |
| | | | | | | | | No. 3, Lucknow | 12 |
| | | | | | | | | No. 4, Allahabad | 11 |
| | | | | | | | | „ On march | 1 |
| | | | | | | | | No. 5, Morar | $1\frac{1}{2}$ |
| | | | | | | | | „ On march | $1\frac{1}{2}$ |
| | | | | | | | | „ Meean Meer | 9 |
| | | | | | | | | No. 6, Umritsur | 10 |
| | | | | | | | | „ On march | 1 |
| | | | | | | | | „ Attock | 1 |

| Regiments. | Average Annual Strength. | Admitted into Hospital. | Deaths. In India. | Deaths. Of Invalids. | Deaths. Total. | Annual ratio per 1,000. Admitted. | Annual ratio per 1,000. Died. | Stations during the Year. |
|---|---|---|---|---|---|---|---|---|
| RL. ARTILLERY—*continued.* | | | | | | | | |
| 25th Brigade, R.A. | 370 | 799 | 15 | 1 | 16 | 2159·5 | 43·24 | Batt. months.<br>No. 1, Darjeeling 12<br>No. 2, Delhi 11<br>„ On march ⅓<br>„ Mooltan ⅔<br>No. 3, Morar 12<br>No. 4, Attock 11<br>„ Peshawur 1<br>No. 5, on march ⅓<br>„ Rawul Pindee 4<br>„ On march ⅓<br>„ Khyragully 7 |
| Total Rl. Artillery | 5,975 | 11,324 | 291 | 11 | 302 | 1895·2 | 50·54 | |
| INFANTRY. | | | | | | | | |
| 1st Bn. 3rd Foot | 871 | 623 | 5 | 2 | 7 | 715·3 | 8·04 | Meerut ½<br>Umballa 3⅔<br>Dugshai 8 |
| 1st „ 5th „ | 876 | 1,408 | 12 | 1 | 13 | 1607·3 | 14·84 | Ferozepore 11⅔<br>On march ⅓ |
| 1st „ 6th „ | 831 | 1,640 | 18 | .. | 18 | 1973·5 | 21·66 | Rawul Pindee 12 |
| 1st „ 7th „ | 810 | 1,693 | 72 | 1 | 73 | 2090·1 | 90·12 | Saugor 11<br>On march 1 |
| 1st „ 11th „ | 843 | 806 | 32 | .. | 32 | 956·1 | 37·96 | Fyzabad 10<br>On march 1½<br>Morar ½ |
| 2nd „ 12th „ | 738 | 1,394 | 51 | 3 | 54 | 1888·9 | 73·17 | Jubbulpore with wing at Nowgong 12 |
| 1st „ 14th „ | 760 | 958 | 24 | .. | 24 | 1260·5 | 31·58 | Cawnpore 12 |
| 1st „ 19th „ | 807 | 1,605 | 7 | .. | 7 | 1988·4 | 8·67 | Rawul Pindee 10⅔<br>On march 1⅓ |
| 2nd „ 25th „ | 846 | 1,097 | 12 | 2 | 14 | 1296·7 | 16·85 | Bareilly 12 |
| 26th Foot .. | 871 | 904 | 20 | 2 | 22 | 1037·9 | 25·26 | Calcutta 12 |
| 36th „ .. | 727 | 2,209 | 127 | .. | 127 | 3038·5 | 174·69 | Peshawur 9⅔<br>On march 1<br>Rawul Pindee 1⅓ |
| 37th „ (H.-Q.) | 518 | 367 | 17 | .. | 17 | 708·5 | 32·82 | Shahjehanpore 12 |
| Left Wing | 340 | 358 | 11 | .. | 11 | 1052·9 | 32·35 | Moradabad 12 |
| 38th „ .. | 865 | 1,298 | 9 | 1 | 10 | 1500·6 | 11·56 | Sealkote 9⅔<br>On march 1⅓<br>Peshawur 1 |
| 39th „ .. | 115 | 111 | 1 | .. | 1 | 965·2 | 8·70 | Arrived from England.<br>On march 1<br>Ferozepore ½ |
| 41st „ .. | 842 | 1,981 | 37 | 3 | 40 | 1283·8 | 47·50 | Agra 1⅔<br>On march ⅓<br>Subathoo 9<br>Umballa 1 |

*Bengal*, 1869.

| Regiments. | Average Annual Strength. | Admitted into Hospital. | Deaths. In India. | Deaths. Of Invalids. | Deaths. Total. | Average ratio per 1,000. Admitted. | Average ratio per 1,000. Died. | Stations during the Year. | months. |
|---|---|---|---|---|---|---|---|---|---|
| INFANTRY—*cont.* | | | | | | | | | |
| 55th Foot .. | 927 | 773 | 18 | .. | 18 | 833·9 | 19·42 | Lucknow | 2 |
| | | | | | | | | On march | 2 |
| | | | | | | | | Chuckratta | 8 |
| 58th „ .. | 661 | 1,906 | 125 | 2 | 127 | 2883·6 | 192 13 | Allahabad | 12 |
| 2nd Bn. 60th Ft., Right Wing .. | 406 | 566 | 12 | 1 | 26 | 1394·1 | 32·99 | Seetapore | 12 |
| Left Wing .. | 382 | 796 | 13 | | | 2083·8 | | Calcutta | ½ |
| | | | | | | | | Benares | 11½ |
| 62nd Foot .. | 765 | 1,023 | 88 | .. | 88 | 1337·2 | 115·03 | Arrived from England. | |
| | | | | | | | | On march | 1 |
| | | | | | | | | Lucknow | 10 |
| 77th „ .. | 739 | 559 | 11 | .. | 11 | 765·0 | 14·88 | On march | 1½ |
| | | | | | | | | Agra | 10½ |
| 79th „ H.-Q. Wing .. | 411 | 760 | 6 | 4 | 21 | 1028·4 | 29·04 | Roorkee | 11 |
| | | | | | | | | On march | ½ |
| Left Wing .. | 312 | 707 | 11 | | | 2266·0 | | Jubbulpore | ½ |
| | | | | | | | | Delhi | 12 |
| 85th „ .. | 814 | 2,925 | 15 | .. | 15 | 3593·4 | 18·43 | Meean Meer and Lahore | 12 |
| | | | | | | | | Det. at Dalhousie | 7 |
| 88th „ .. | 706 | 1,565 | 33 | .. | 33 | 2216·7 | 46·74 | Nowshera and Attock | 12 |
| | | | | | | | | Jullundur | 12 |
| 92nd „ .. | 847 | 2,149 | 40 | 2 | 42 | 2537·3 | 49·59 | Det. at Umritsur, Dalhousie, and Kussowlie. | |
| 93rd „ .. | 593 | 1,694 | 21 | 1 | 22 | 2856·7 | 37·10 | Jhansi | 12 |
| 96th „ .. | 741 | 1,001 | 30 | .. | 30 | 1350·9 | 40·48 | Arrived from Bombay. | |
| | | | | | | | | Calcutta | 10 |
| 102nd „ .. | 685 | 851 | 30 | .. | 30 | 1242·3 | 43·79 | Lucknow | 12 |
| 103rd „ .. | 686 | 1,652 | 58 | .. | 58 | 2408·2 | 84·55 | Morar with det. at Fort Gwalior | 11 |
| | | | | | | | | On march | ½ |
| | | | | | | | | Roorkee | ½ |
| 104th „ .. | 683 | 1,850 | 90 | 2 | 92 | 2708·6 | 134·70 | Peshawur | 12 |
| 105th „ .. | 778 | 1,137 | 31 | 4 | 35 | 1461·4 | 44·99 | Meerut | 12 |
| 106th „ .. | 780 | 915 | 12 | 1 | 13 | 1173·1 | 16·67 | Umballa | 12 |
| 107th „ .. | 807 | 864 | 17 | 1 | 18 | 1070·6 | 22·30 | Hazareebaugh | 12 |
| 109th „ .. | 819 | 1,765 | 21 | 1 | 22 | 2155·1 | 26·86 | Mooltan with det. at Dera Ismail Khan | 12 |
| 3rd Bn. Rifle Bde. | 848 | 1,191 | 22 | 1 | 23 | 1404·5 | 27·12 | Dinapore | 12 |
| | | | | | | | | Det. at Chunar | 11½ |
| Total Infantry.. | 26,050 | 44,201 | 1159 | 35 | 1194 | 1698·8 | 45·83 | | |

The admissions and deaths were lowest in the Cavalry, not greatly exceeding the results of the preceding year, and were highest in the Royal Artillery, in which there was a considerable increase in the proportion admitted, and the ratio of deaths was nearly double that of 1868. In the Infantry both the admissions and deaths were lower than in the Artillery,

but were much higher than in 1868, the deaths indeed being more than double the previous ratio.

In the Cavalry the highest proportion of admissions was from the 4th Hussars at Meerut, and the lowest from the 5th Lancers at Lucknow; the excess in the former was chiefly from fever. The highest ratio of deaths occurred in the 19th Hussars at Benares and Cawnpore, and the lowest in the 11th at Muttra.

In the Royal Artillery the admissions were highest in the 19th Brigade and lowest in the 8th; the mortality was highest in the 24th Brigade from cholera, and lowest in the C Brigade Royal Horse Artillery, but as there was only one Battery of that Brigade in the country the comparison with the other Brigades is scarcely fair. The 25th Brigade had the lowest ratio except the C Brigade, but it amounted even in it to 43·24 per 1,000. The cause of the excess was cholera.

The Infantry furnished the highest ratio of admissions of any single corps in the Command in the instance of the 85th Regiment at Meean Meer, in which they amounted to 3593 per 1,000 of the strength, chiefly from paroxysmal fevers; the lowest ratio was in the 1st Battalion 3rd Foot at Dugshai and Umballa. The 58th Regiment at Allahabad had the highest ratio of deaths, but it was also extremely high in the 36th and 104th at Peshawur and the 62nd at Lucknow, in consequence of epidemic cholera prevailing in them. The lowest ratio of deaths was in the 1st Battalion 3rd Regiment at Dugshai, and it was also very low in the 1st Battalion 19th Regiment at Rawul Pindee; indeed in these two corps the death rate did not exceed that of troops serving at home.

# APPENDIX.

## APPENDIX No. I.

## REPORT ON HYGIENE FOR 1871.

By E. A. PARKES, M.D., F.R.S., Professor of Hygiène in the Army Medical School.

THE most important work on Military Hygiene which has been published during the year is the German "Manual of Military Hygiene,"* by Dr. Roth and Dr. Lex. The first half of the first volume only has been published; it contains four chapters, viz., on Water, Air, Earth, and Weather, and consists of 350 very closely-printed pages. The two first chapters are by Lex; the two last by Roth; all have been compiled with the most conscientious care. It may truly be said that nothing is left untouched, and that every point is most thoroughly considered, and clearly told. The book will take the first rank among treatises on Army Hygiene, and is a good instance both of the thoroughness of German work and of the attention which is being given to every point connected with the German Army.

The various Reports and Blue Books from the American, Indian, and Home Governments are always valuable contributions to hygiene. An American "Report on Barracks and Hospitals," Circular No. 4 (Washington, 1870) is a very able document, and contains plans of barracks, huts, methods of warming, &c., by Dr. Billings, of the United States Army; there are also descriptions of every military post at present occupied, with plans of the barracks; so that there is a great amount of very interesting sanitary information.

A Report issued by our own War Office† will be found extremely useful, as giving an account of the practical working of a number of different contrivances which have been under trial for the last few years. The original cost, expense of keeping in order, and efficiency of several kinds of baths, lavatory ranges, latrines, waterclosets, urinals, and sinks, are stated. There is also a notice of the action of the new warming and ventilating arrangements, which is pronounced to be satisfactory.

The Navy Report‡ is, as usual, a very practical work. At page 40, *et seq.* are some important observations on enteric fever in the Mediterranean command. There was one form on board the "Caledonia," which the reporter calls "influenza enterica," which appears to have been a respiratory affection with marked gastro-enteric complication, as in some outbreaks of pandemic influenza. The crew of the "Caledonia" went out to Malta in the "Revenge," and many men suffered all the way out from a "febrile catarrh," accompanied by sore throat; they remained in Malta Harbour, on board the "Hibernia," for some time, and then went on board their own ship, the "Caledonia," which was in perfect order and extremely clean. They left Malta a fortnight after arrival, on the 5th of June, and on the 16th of June, after having been 11 days at sea, no less than 50 men were suddenly attacked with diarrhœa, for which there was no possible local cause in food or water discoverable. Altogether up to September 198 cases occurred of this peculiar febrile attack, in which there were both respiratory and gastro-enteric symptoms, attended with fever and marked depression. Checking the diarrhœa was

* "Handbuch der Militär-Gesundheitspflege," von Dr. W. Roth and Dr. R. Lex. Band I. Berlin, 1872.

† "Report on Sanitary Appliances introduced into Barracks." Blue Book. 1871.

‡ "Statistical Report of the Health of the Navy for the Year 1869." Blue Book. 1871.

hurtful, and mild laxatives were useful. There were no deaths, but 23 men were subsequently invalided for various *sequelæ*.

In the Report on the North American and West Indian Stations are some very interesting facts connected with the carriage and propagation and symptoms of yellow fever, and a very strong recommendation is given to run without delay to a cold latitude when yellow fever appears. "The accumu-" lated mass of experience on this point is so great that nothing but the most " urgent necessity should justify any temporising or procrastination in respect " to this measure": (p. 100.)

A good account is given (p. 237) of cholera at Zanzibar in 1869; and in the Appendix are some very useful Reports on the Health of the Royal Marines, by Dr. Jenkins, C.B., Dr. Harvey, Dr. Domville, C.B., and on the dock-yard and lunatic asylum by the respective Medical Officers. There is also a very able paper on Heat as a physiological, pathological, and therapeutic agent, by Dr. Rattray, and one on the Boys in the Training Ships, to both of which I hope to refer next year.

The Indian Reports are, as usual, of the greatest importance. Dr. Cuningham's Sanitary Report to the Governor of India for 1870; the Madras Sanitary Report for 1869; Dr. Cornish's Reports on Cholera in Southern India, and on the Outbreak of Cholera at Secunderabad; Dr. Macnamara's Eighth Report on the Analysis of Potable Waters in the Bengal Presidency; Dr. Smith's Sanitary Report of Her Majesty's British Forces serving in the Bengal Command; Dr. Bryden's paper in Dr. Cuningham's Report, and the Blue Book, also published by him under the title of "Vital Statistics of the Bengal Presidency"; Dr. Hewlett's Health Officers' Reports from Bombay, and the very useful summary of most of these made by Mr. Plowden, and published in this country by the India Office, contain so much useful matter that the whole of this Report would be filled with extracts if anything like a faithful account of them was attempted; but as most of my readers see these documents, I must content myself with selecting two or three special points for comment hereafter.

Dr. Guy has delivered three lectures on "War in its Sanitary Aspects," which have appeared in abstract, but which it is to be hoped will be published in full.

Of the Civil Sanitary Reports the first place must be given to those of the Royal Sanitary Commission;* a document which is expected to lead to important changes in the English law. The Rivers Pollution Commissioners have published a third report, which deals with the pollution arising from the woollen manufacture, and the cure for which, as in the case of sewerage, is application to land.

In America, the Second Annual Report of the State Board of Health of Massachusetts† contains two sets of investigations. The first is on the origin of typhoid fever. The reporters have collected much evidence: some very good; other parts very loose and imperfect, and they sum up their conclusions as follows: The propagation by drinking water finds little favour as a general cause, though the occasional propagation is admitted (p. 168); the production through air rendered foul by decomposition of nuisances going on especially "*under cover*" (as the reporters express it) is supposed to be far more common; the production by emanations from the soil is partly admitted, and Pettenkofer's views, though they have not been tested (p. 175), find some favour. The doctrine of a specific virus seems to be placed in the back ground, and the conclusion finally is, that "the single continuous thread of " probability leads uniformly to the *decomposition of organized* (and chiefly " vegetable) *substances* as the cause of typhoid fever as it prevails in Massa-" chusetts" (p. 178). On the whole, in spite of some good evidence, this paper " appears hardly likely to settle this controversy.

The second important paper in this Report is an "Inquiry on the Effects " of Intoxicating Drinks on Public Health." The following digest of the replies is given from 164 correspondents:—

* "Second Report (Statutes and Evidence) of the Royal Sanitary Commission." Vols. I., II., and III. 1871.

† Boston. 1871.

| | Replies. |
|---|---|
| Very destructive to life and health .... ... .... | 48 |
| Injurious in a greater or less degree .... .... .... | 49 |
| Public health not affected by use in their towns .... | 16 |
| The people of their towns very temperate .... .... | 27 |
| Intoxicating drinks not used in their towns .... .... | 5 |
| Effects bad on foreigners, but not on natives .... .... | 4 |
| Useful in the decline of life .... — .... .... | 1 |
| Use promotes longevity .... .... .... .... .... | 1 |
| Indefinite replies .... .... .... .... .... .... | 13 |

The names of the five towns where no intoxicating drinks are used ought not to rest in oblivion.

A great deal of correspondence on the use of alcoholic drinks, from the American Legation abroad is also given. Among other letters, there is one from Sir Robert Christison, in which an opinion is expressed that, while in the better classes in Scotland there is less drinking than formerly, in the working classes there is more, and that three-fourths of the crimes against the person are more or less connected with drunkenness.

Of private works and essays published on hygiene it is impossible to give any list: one or two may be mentioned. Miss Nightingale's "Notes on Lying-in Institutions," deals most clearly with the facts of the amount, the causes, and the best means of remedying the mortality in those hospitals.

A work on the Diseases of Workmen* has been commenced by Hirt. The part now published deals only with diseases caused by dust inhalations; a copious bibliography and very minute details render the work most valuable.

A work by Dr. Sansom,† on Disinfection, as connected with fermentation, putrefaction, and infection, gives a good *resumé* of the subject, and contains several original observations. Dr. Austin Flint's work on the Relations of Urea to Exercise touches on a physiological point which is of hygienic interest, and is an example of a careful investigation, though the determinations of the ingress of nitrogen is not so accurate as that of the exit, and raises a doubt as to the correctness of the conclusions.

Dr. Beale's two books on Disease Germs—their real and supposed nature (published in 1870), and numerous articles by Bastian, Hallier, and others, on low forms of animal and plant life are important additions to this difficult controversy.‡

A vast number of journal articles have appeared, and a special English journal§ has been commenced, which promises to be at the same time popular and useful to all students of the public health. The German Quarterly Journal of Public Health‖ continues to furnish articles of interest on all sanitary subjects, and Hallier's Journal of Parasitic Information is becoming the medium of some very interesting inquiries.

The subjects in the following Report are arranged under the following headings:—

Air.
Water.
Food.
Sewerage.
The Specific Diseases.
Parasitic Origin of Disease.
The Nature of Contagion.
Marches and Knapsacks.
War Hospitals.
Burials in War.

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* "Die Krankheiten der Arbeiter." Von Dr. L. Hirt. Erste Abtheil. Breslau. 1871.

† "The Antiseptic System." By A. E. Sansom, M.D., Lard. London. 1871.

‡ Some idea may be formed of the library of books which have been published in the last two or three years on the germ and cryptogamic origin of infectious diseases, from Richter's last article in Schmidt's Jährb. No. 9. 1871. No less than 150 treatises or essays on this subject are enumerated and analyzed.

§ "Food, Water, and Air." Edited by A. H. Hassall, M.D.

‖ "Deutsche Vierteljahrschrift: für. öff. Gesundheitspflege."

## Air.

*The Invisible Organic World of the Atmosphere.*—No man is better entitled to speak of the particles, living and dead, which float, invisible to our unaided eyes, in the atmosphere than Ehrenberg. He has added to his former labours by collecting into a treatise all the observations made by *himself* and others on this subject since 1847.* The first part of the work contains a complete history of what has been done in the investigation, and a chronological retrospect of the falling of meteorolites, and red dust and sand, and red rain and snow. Passing over all these carefully recorded details, and the discussions to which they give rise, we may give a very brief summary of the leading statements:—

1. The Dust or Sand (or so-called Monsoon) Showers.—Up to 1847, there had been 27 microscopic examinations of dust showers, and 310 organic forms had been identified and named, viz., 137 polygastrica, 91 phytolithariæ, 19 polythalamia, 51 soft plant portions, and 7 fragments of insects. Since 1847, there have been 43 examinations in new localities, and in these 313 forms have been found, viz., 127 polygastrica, 120 phytolithariæ, 13 polythalamia, 43 portions of plants, an uncertain fragment of polycystina, and 9 other animals. Of these 313, only 163 were identical with the forms determined in the previous period, so that altogether 460 forms have been discovered. Of these, the polygastrica, which possess the power of increase, give 194 forms, and the phytolithariæ, which cannot increase, give 145 forms. Of the polygastrica the bacillaria are by far the most common.

From these examinations it appeared that the red dust lifted from the common surface dust from Africa, as well as from Europe, America, and Asia, possesses peculiar characters. The organic contents belong in great measure not to salt, but to fresh-water forms; the red colour is given by oxide of iron which possibly is derived from the *Gallionella ferruginea.*

Drawings are given of the greater number of these forms, as shown in the dust storms at Ispahan, in May 1870; at the Dardanelles, in March, 1869, at Jamaica, in April 1870; and at other places.

2. *The Invisible Living Creatures in the Atmosphere, independent of Dust Storms.* Ehrenberg remarks that it is now known with certainty that the smallest life forms are—not, it is true, invariably but—often found in immense quantities, and are carried by the movements of the atmosphere through wind and warmth to great heights. These appearances belong to the customary atmospheric conditions, and are of importance in respect of the possible poisonous action of some of them. In 1848, therefore, during the visitation of the cholera, Ehrenberg examined (by a power of 300 diameters) the dust in the air of houses, cupboards, towers, museums, libraries, cholera hospitals, &c., and also in the external air in other places, as Dresden, Weimar, Switzerland. Over 200 organic forms were discovered; polygastrica, rhizopods, tardigrades, and anguillulæ. It may be interesting to note that Ehrenberg says in a sample of Alpine dust from Monte-Rosa, collected in 185, and containing rhizopods and tardigrades, it was found that, after four years' perfect dryness these animals revived when put into distilled water.

In addition to these animals, there have been found in the air many sporidia and sporangia of fungi and cryptogamic plants.

In the atmospheric dust showers these animals and plants can sometimes be found in the act of cleavage; and the red and green colour of the dust is often given by polygastrica (such as *Eunotia amphioxys, Synedra Entomon,* and *Pinnularia borealis*), which have green, brown, or red contents.

In the air-dust of Berlin the Eunotia amphioxys and Pinnularia borealis are the most numerous, and, at times, never fail: but they are uncommon in the water at Berlin. As in the water at Berlin 400 kinds of siliceous-coated polygastrica are known, Ehrenberg asks why it is that the two above named are the only two found in the air of Berlin. They are both found largely among the Monsoon-dust animals, and Ehrenberg hints at their presence in the air of Berlin being connected with this.

* Uebersicht der seit 1847, fortgesetzten Untersuchungen über das von der Atmosphere unsichtbar getragene reiche organische Leben. Von C. G. Ehrenberg. Berlin, 1871.

This chapter puts three points very clearly, viz., the abundance of life, the long retention of life after drying, and the possibility that the air even of an inland town like Berlin may be largely influenced by the air coming from great distances—from the Atlantic, or from the African or American continents.

3. The Injurious Organic Atmosphere Bodies.—On this head Ehrenberg has naturally little to say, nor indeed is it possible for any one yet to say whether any of the organised beings which float in the air are hurtful or not. After referring to the very old opinion that great epidemic diseases arose from air-zoophytes, or air insects, or worms, and to the views of Linnæus, he refers to his own investigations in the cholera of 1848, and states that he could then find nothing remarkable or uncustomary in the air of Berlin. Although he refers to Pouchet, Pasteur, and Tyndall, he expressly avoids any account of the newest attempts at researches in this direction, as such an account would occupy too much space. He has thus deprived his work of its most important chapter, and has seriously lessened its value. A critique from Ehrenberg of all the observations on atmospheric bodies which have been made would have been priceless. He makes an allusion to Dancer's examination of the water impregnated with air by Dr. A. Smith, in Manchester, and expresses a doubt on the origin of the numerous spores discovered in it, remarking, that in his numerous examinations he has often seen disintegrated fungus-spores, but never great heaps, while he has never missed seeing sand and bacillaria, which Dancer did not find.

In connection with this subject he narrates seven instances of dust storms being attended with disease among men or cattle, but they are chiefly of old date (in the years 786, 1346, 1557, 1689, 1705, 1792, and 1869). In the last year referred to, all the cattle feeding on a hill near Verona were said to be attacked with illness after breathing a dry fog. It must be said indeed that this chapter shows only how very incomplete our knowledge is, and how many more determinations must be made both of the floating constituents of the air during times of health and in periods of epidemics before we shall arrive at any certainty.

It is rather surprising that Ehrenberg has not found more fungi in the air, for they are certainly common in England, as shown lately by Maddox and many others, and that he does not mention the existence of pollen in the spring and summer. This is present in great quantity in the air of England, and is believed to be the cause of attacks of catarrh as well as of asthma.

4. The Morpholithic Bodies simulating Organisms.—Ehrenberg gives a short chapter to this point on account of the necessity of not confounding the peculiar mineral bodies which present appearances different from the flat surfaces of crystals, or the figures resulting from mathematical laws, and resemble living bodies in their rounded orbicular and cylindrical lines and shapes. He believes that great confusion is arising from the supposed connection of these particles with living beings, and (though not found in the air) refers especially to the so-called cocolithes of the chalk as an example of what he considers such an error. He denies altogether that the cocolithes (or so-called bathybius) have ever been living. He thinks the error likely to become still greater since morpholithes (of entirely mineral nature) occur in dust which in all probability is truly meteoric (*i.e.*, enters our world from the realms of space), and have been mistaken for remains of organisms. He refers especially to the observations of Dr. Weisse on the meteor dust which fell in 1834 at Irkutzk, and which contained many corpuscles, which Weisse took for remains of polythalamia, and named *Rotalia globulosa* and *R. senaria*.

The remainder of the book is occupied by a short discussion on the origin (cosmical or telluric) of the showers, in which Ehrenberg inclines strongly to the telluric origin; by an enumeration of the points which should be worked out by future investigations, and by a general summary of conclusions.

*Dust from Railways.*—Mr. Sidebotham* examined the dust which drifted through the open window of a carriage on the railway close to Birmingham. The particles were of large size, and no less than one-half were iron, and were attracted by the magnet. They were evidently derived from manufactures, being fused particles of dross or burned iron like clinkers; many were rounded or rough on the surface, and sometimes covered with spikes and excrescences.

* "Chemical News," October 1871.

The rest of the particles consisted of light angular fragments of glass and quartz, a few bits of yellow metal, opaque white spherical bodies, grains of sand, a few bits of coal.

It must be understood, however, that this dust was heavy, and fell at once so that it would not, of course, represent the free floating particles, and as a rule probably little of it would be drawn into the lungs.

*Fungi in the Air.*—Dr. Maddox described in the "Monthly Microscopical Journal for June 1870," an apparatus for collecting floating particles in the air, and in the same journal for February 1871 (p. 55), he figures a number of fungi collected from the air, and the forms derived from them by cultivation. There was no relation observable between the direction or force of the wind and the spores deposited on the glass sides, but there was a much greater quantity of dust when the ground was not wet. Sometimes not a single spore was collected; on other days, 60, 87, 112, up to 250 (the largest number) were found in one day. The prevailing spores were small, pale, olive-coloured, and oval; they were apparently some form of smut.

*Dust and Disease.*—Tyndall has given another lecture on this subject at the Royal Institution, which is chiefly valuable as showing the aspect in which the hypothesis of infectious disease presents itself to a mind accustomed to the exactest investigations. It is that which many medical men have long received. The conviction that the infectious diseases which run their course with such regularity must own special causes, is very clearly expressed. Tyndall says, "as surely as a thistle was from a thistle seed, as surely as a fig "comes from the fig, the grape from the grape, the thorn from the thorn, so "surely does the typhoid virus increase and multiply into typhoid fever, the "scarletina virus into scarlet fever, the small-pox virus into small-pox;" and then he goes on to ask, what is the conclusion which suggests itself? "It is this; "that the thing which we call a virus is to all intents and purposes a seed."

I have quoted these words, not as conveying to us a new doctrine, but as one of such importance in its bearing on preventive measures that it is impossible to reiterate it too often. Preventive measures must deal with the "seeds," if they can be found; if not, with the conditions which allow them to grow What are these "seeds" of the infectious diseases? This is the point a which we now stand and wait for still greater refinements in physical exploration before we can expect an answer. Tyndall firmly believes that we have to deal with some form of parasitic life, but from the identification and means of recognizing that form of life we seem at present as far off as ever.

## Water.

*Microscopic Examination of Water.*—Cohn* (quoted by Richter Schmidts Jahrb., Oct 1871, p. 320) makes the following statement on this subject:—The opacity of spring and well water is either permanent, and then arises from suspended and chiefly organic substances, or from an immense development of living creatures (infusoria and water fungi); or a precipitate falls, which is composed of inorganic substances (oxide of iron, carbonate of calcium, quartz, or other kinds of dust), or of organic substances. These last are either from the dust of the air (such as pieces of cotton or woollen fabric, feathers, hairs of plants, bits of wood, starch, spores of fungi), or are derived from the dirty house-water, and are made up of epithelium, mucous corpuscles, fœcal particles; food remnants, as from potatoe, meat, &c.; or they come from the conduits, especially from wood in the form of eaten-away wood cells, or from animals (as rats, spiders, flies) accidentally fallen into the water. But there are besides all these, living animals and plants, and of these Cohn makes three classes:—

(*a*) In tolerably pure water are found living algæ and diatoms, on which feed certain larger infusoria, such as the rhizopods and the entomostraca (Daphnia, &c.). The occurrence of all these creatures is quite compatible with a certain amount of purity. (*b*) Well or spring water which holds much organic remnants in suspension is the soil for fungi, and also for a crowd of infusoria, rotatoria, acari, and anguillulæ. (*c*) If the water contains much

* Cohn's observations are also contained in Lebert's Rückfallstyphus und Fleck-typhus.—Leipzig, 1870, p. 36.

*dissolved* organic matter it putrefies, and then fermentation-fungi and infusoria appear, such as bacteria, zooglæa, vibriones, spirillæ, monads, amæbæ, and ciliated infusoria.

During epidemics the microscope can give an intimation whether the first two innocuous admixtures or the last-named dangerous impurities exist in the water. We cannot also, says Cohn, deny the possibility that some palmetta or zooglæa may be the microscopic carriers of a contagion. In the water of one part of a city which was heavily stricken by cholera, Cohn found so unheard-of quantity of bacteria that he felt constrained to connect this with the disease. Also, in the badly-renowned typhus region of Breslau he examined spring water, in which, besides numerous bacteria, vibriones, &c., the new algæ (the Crenothrix of Cohn) was developed.

*The Microzyme Test for Water.*—Dr. Sanderson in his paper on Microzymes* has proposed a new test for water. A little Pasteur's solution is put in a glass tube previously heated, and is boiled; a few drops of the water to be examined are put in, the mouth of the tube is closed with cotton wool, and the tube is left. In the course of a few days, if the water contained bacteria the fluid becomes milky and then quite turbid: this is visible to the naked eye, and under a high power (630 to 1,000 diameters), the milkiness is found to depend on countless microzymes. Pasteur's fluid is composed of 10 grammes of crystallized sugar, ·5 grammes of tartrate of ammonia, ·1 of well-burnt yeast ash, and 100 c. c. of water. After standing and filtration it should be quite clear.

This test shows that microzymes are in the water examined, but it is yet doubtful what value should be attached to the observation. Even some specimens of distilled water, and water so pure as not to show solid particles by Tyndall's plan of the electric beam, contain microzymes, so that at present it is impossible to say a water would be bad if it caused the appearance of microzymes in Pasteur's solution.

*Spread of Typhoid Fever by Water.*—So many undoubted instances have been now recorded of this occurrence that it would seem useless to add to the evidence if it were not that in Germany doubts are still expressed of the truth of the statement. An essay by Wohlrab† gives an account of an outbreak of typhoid (typhus abdominalis) which, in two respects, is important. The little town of Oberwiesenthal, in Saxony, is 2,800 feet above the sea, and stands on a hill, with a fall on three sides, the fourth rises to the Fichtelberg the highest hill in Saxony. A very pure mountain stream supplies the town, and is distributed in wooden pipes, which are often allowed to become foul before they are changed. They often run near or through open middens, and therefore when the pipes are rotten, impurities easily pass in. In spite of this, the town has always had a reputation of health, and in two years and a-half before the outbreak now recorded, no cases of typhoid had been seen. The ground is also not adapted for lodgment of water, and very heavy rains wash away surface impurities. At the beginning of April 1870 a man, aged 54, by trade a pedlar, was attacked with enteric fever. He probably got this disease on his travels, as since the commencement of March he had been away from home. This, then, was the first point of importance, viz., the introduction of the disease from without (in all probability) into a town free from typhoid fever for 30 months at least. The wife of this man took the disease in May; but before this, between the 16th and 25th of April, there suddenly appeared in a group of five houses not far from that of the pedlar, not less than six cases of typhoid. No personal communication with the pedlar was traceable; in other words, there was no personal contagion. But the water which supplied these five houses was noticed, in the middle of April, to have a remarkably fœtid smell and taste. It so happened that, in 1869, the water had been bad in the same houses, but no enteric fever had followed. Wohlrab naturally came to the hypothesis that on this last occasion, in addition to common putrid substances, the discharges from the pedlar might have got in and proceeded to examine into this point.

Next to the pedlar's house are two small houses, and then a larger one standing in a garden. In these there was no enteric fever in April. Then

* Thirteenth Report of the Medical Officer to the Privy Council.

† "Archiv der Heilkinde." Vol. XII, 1871, p. 134.

came the five houses where the cases suddenly occurred, lying below the terrace of the former houses, and forming the angle of two streets. The water pipe coming from the pedlar's house and carrying water to a cistern supplying these five houses, was found to be very rotten. Above it ran a foul-water drain, coming from a dungheap of the large house next to the pedlar's, and this heap could get mixed with the dungheap of the pedlar's house. The fall of the ground would lead any fœcal substances washed by rain directly from these dungheaps to the water-pipes. It so happened that the ground had been frozen at the end of March, and at the beginning of April there was a thaw on the surface only, and rain on the 10th and 14th of April. It was at this time that the water began to taste and smell so foul, and no reasonable doubt can exist that the dejections thrown on the midden must have been washed in, and, as some of these were from the pedlar, who was ill with typhoid fever, the discharges from his intestines must most probably have been among the fœcal washings which got into the rotten water-pipes. That the water was impregnated with fœcal matter was not only shown by the taste and smell, but by the following fact. The pure water from the mountains contains no chlorine; on the 22nd of April the water from the pipe feeding these houses contained a very large quantity of chlorine, and, after three or four weeks, a great development of algæ occurred.

This evidence seems irreproachable, but the epidemic which subsequently prevailed in the town gave other instances in which fœcal contamination of the water was proved both by smell and taste, and by the presence of a large amount of chlorine, and the rapid growth of fungoid vegetation. In one case in May a water was tested, and found to contain much chlorine, although it was good in taste and smell; the people were warned to boil it before use, and did so, yet a case occurred which could only be referred to the water.

Of the whole number of cases occurring in Oberwiesenthal (viz., 70) Wohlrab considers that two were imported, 10 were caused by the infected water, and 25 arose apparantly from personal contagion; the source of the others apparently could not be determined.

The incubative period in the water-caused cases was sometimes shorter, sometimes longer than usual, and the severity also varied. Mixed up with the decided typhoid cases were a number of cases of diarrhœa, which were considered abortive cases of typhoid; there was more or less heightened temperature for many days. In some cases there was a kind of choleraic tendency.

*Dysentery from Water.*—The following curious case is related by Professor Champouillon, of the Val de Grâce.* In 1852, two regiments (the 19th Light Infantry and the 44th of the Line) were barracked at Neuilly, in Paris. During the month of August the first regiment was attacked with a grave form of dysentery, while the other regiment had only a few cases of diarrhœa. The water was the same, viz., drawn from the Canal de l'Ourcq, which is known to be very impure, and a hasty observer might therefore have excluded all idea of the water being the cause, but Champouillon discovered that the two regiments had different modes of dealing with the water. The 19th added brandy to it, and it was noted that this caused it soon to become putrid, if the water vessels were allowed to remain in the barrack-rooms. The spirit, in fact, precipitated the organic matter on the sides and bottom of the vessel, and it there soon putrified, and made of each vessel "a little movable marsh." The other regiment took their water either as coffee or mixed with red wine, the tannin of which prevented putrefaction. Red wine being substituted for brandy, the 19th Regiment soon became free from dysentery.

*Water in Zinc Vessels.*—M. Zinrek† has examined the amount of zinc dissolved by water running through zinc pipes or received in zinc cisterns. He found the metal more acted upon if there were chlorides, especially chloride of sodium, in some quantity in the water. Boiling did not precipitate the zinc. It is recommended that the zinc should be well covered with a coat of good oil, with a base of asphalt, but without minium, white lead, or white of zinc.

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* "Recueil de Mémoires de Med. Mil., 1871, September," p. 230.

† Ann. d'Hygiene, July, 1871, p. 220.

## Food.

*German Food Supplies during the late War.*—Dr. Roth, the Surgeon-in-Chief of the Saxon Army,* says that three modes of supply were had recourse to:—

1. During the marches in Germany the men were billeted, and money was paid for their food.

2. Supplies were drawn from the magazines.

3. Supplies were obtained by requisition when the troops entered France. This last plan he considered a bad one, as was especially shown in the march to Sedan, where the Germans passed over a country previously nearly exhausted by the French. The principal defect was the great uncertainty and irregularity of the supplies; some corps received too much, others too little, and the hospitals especially, who had not men to send out to get supplies, were particularly badly off. The quality of the food was also often bad; so that, as far as the health of the troops is concerned, the system of supplies by requition should be as little used as possible. It must be noted, however, here, that the Germans did not pay ready money, which might, perhaps, have attracted better supplies than the system of written vouchers. The magazine supplies were excellent, but occasionally failed in certain articles as fresh meat, as a substitute for which the celebrated pea-sausage was issued. But it was found that if the pea-sausage was used too exclusively, the men turned against it. In fact, one of the greatest difficulties was the too great uniformity of the food. To do away with this, bacon, preserved and smoked meat, peas and white beans, and potatoes, when possible, were issued as a change of diet. Independent of these extra issues, the daily German war-ration was as follows, in English weights:—

| | | |
|---|---|---|
| | Bread .... .... | 26½ ounces, or biscuit 17 ounces. |
| One of these | Fresh or salt meat .... .... | 13 ounces. |
| | Salted beef or mutton .... .... | 9 ounces, or |
| | Bacon .... .... .... ... | 5¾ ounces. |
| | Rice .... .... .... .... .... | 4·4 „ |
| One of these. | Barley or groats .... .... .... | 4·4 „ |
| | Peas or beans .... .... .... | 8·8 „ |
| | Flour.... .... .... .... .... | 8·8 „ |
| | Potatoes .... .... .... .... | 3·3 lbs. |
| | Salt .... .... .... .... .... | ·7 ounces. |
| | Coffee .... .... .... .... | .7 ounces of unroasted or 1 ounce of roasted. |

The want of knowledge of cooking was very great, and also the addition of articles to give flavour, as vinegar and spices, would have been much prized. Roth strongly recommends the establishment of a school for cooking, like that at Aldershot.

The bread, owing to the long time it was on transport, was sometimes mouldy.

*Alcohol on Active Service.*—The Red River Expedition occurred at a time when the public attention was so engrossed with other matters that little attention was paid to it. Yet it was memorable in several ways, and perhaps in none more so than the fact that a most toilsome and prolonged march was performed without any allowance of spirits, wine, or beer. Two accounts have been published, oneby Captain Huyshe,† and the other by an Officer, who wrote an interesting account of the march in "Blackwood's Magazine."‡

Captain Huyshe says, "Although it was an unheard-of thing to send off "an expedition into a wilderness for five months without any spirits, still as "the backwoodsman was able to do hard work without spirits, it was rightly "thought the British soldier could do the same. The men were allowed a "large daily ration of tea, 1 oz. per man—practically as much as they could "drink; and, as I am now on this subject of bohea *versus* grog, I may as well

* "Deutsche Viertljahrs: für öffentl. Ges., Vol. III., 1871, p. 64.

† "Journal United Service Institution, 1871." Vol. XV., p. 74.

‡ January 1871, p. 64.

"state that the experiment was most successful. The men of no previous "expedition have ever been called upon to perform harder or more continuous "labour for over four months. . . . They were always cheery, and worked "with a zealous will that could not be surpassed. This expedition would have "been a bright era in our military annals had it had no other result than "that of proving the fallacy hitherto believed in of the necessity of providing "our men when in the field with intoxicating liquors."

The writer in "Blackwood's Magazine" says, "The men were pictures of "good health and soldier-like condition whilst stationed at Prince Arthur's "Landing and the other larger camps. The men had fresh meat, bread, and "potatoes every day. No spirits were allowed throughout the journey to "Fort Garry, but all ranks had daily a large ration of tea. This was one of "the very few military expeditions ever undertaken by English troops where "intoxicating liquor formed no part of the daily ration. It was an experi-"ment based upon the practice common in Canada, where the lumbermen, "who spend the whole winter in the backwoods, employed upon the hardest "labour, and exposed to a freezing temperature, are allowed no spirits, but "have an unlimited quantity of tea. Our old-fashioned Generals accept, with-"out any attempt to question its truth, the traditional theory of rum being "essential to keep the British soldier in health and humour. Let us hope "that the experience we have acquired during the Red River Expedition may "have buried for ever this old-fogyish superstition. Never have the soldiers "of any nation been called upon to perform more unceasingly hard work; and "it may be confidently asserted, without dread of contradiction, that no men "have ever been more cheerful or better behaved in every respect. No spirit "ration means no crime; and even the doctors, who anticipated serious illness "from the absence of liquor, will allow that no troops have ever been healthier "than we were from the beginning to the end of the operation. With the "exception of slight cases of diarrhœa, arising from change of diet, it may be "said that sickness was unknown amongst us."

These accounts are most interesting and important, yet it is unfortunate that both writers should know so little of the history of military expeditions as to assert that such experience is novel, or that English Army Surgeons have not for nearly a century repeatedly advised the plan now brought forward as something quite new. It is disheartening to find that all that has been said is so completely overlooked that two officers can be found to believe they are the pioneers in this matter. However, the mistake is of little moment, and the evidence is invaluable.

The food during the Red River Expedition was, daily—

1 lb. salt pork, or 1½ lb. fresh meat.
1 lb. biscuit, or 1½ lb. of fresh bread.
½ pint beans, or ¼ lb. preserved potatoes.
1 oz. tea.
2 ozs. sugar.
½ oz. salt with the fresh meat.
$\frac{1}{36}$ oz. pepper.

This was a good ration, plentiful and simple. No doubt also some kind of fresh vegetables was at times procurable.

*The Effect of Alcohol on the Temperature of the Body.*—Binz communicates a second paper* on the influence of alcohol. The experiments were made on Dr. Mainzer and one other person, and the temperature was measured in the rectum. In the case of Dr. Mainzer it was concluded "that no noticeable "alteration in the normal course of the temperature was produced by taking "spirit containing 98 per cent. of alcohol, in doses of 15 to 80 c.c." (½ to 2½ ozs.)

In the second man the alcohol produced a slight tendency to fall in temperature. In the first experiment it was perhaps not noticeable; in the second and third experiments the fall was ·4 and ·3, which occurred also at the time when without alcohol there would have been a rise.

* "Virchow's Archio Band," p. 529, 1871.

*Dried Skins as Food.*—Among other experiences on strange foods which the Parisians made during the siege was one recorded by Chevallier.* In December 1870 two persons exposed for sale a white coloured substance, with the announcement that it was "fresh calf's-head." The public were astonished, as all cattle had long before disappeared. The police seized the new viand in order to examine its nature, and it was found that the inventors (for they deserve the name) had had the idea of making use of the dried skins of cattle and sheep which are brought into Paris from America, Russia, and Germany in large numbers to be used in various trades. By soaking for twelve hours in cold and then in boiling water, the hair or wool easily comes off, and the skin can be then gently cooked with water and a little white wine or vinegar, and seasoned with onions if procurable, or thyme, or laurel. "The circumstances under which we were placed," says Chevallier, "led me to repeat these experi-" ments with interest, and I found that a very good dish was procured, and " that it communicated an agreeable flavour to horse-flesh soup."

*Scurvy during the Siege of Paris.*—Professor Delpech † has published a paper on the causes of the appearance of scurvy in Paris, and at the same time he analyses with care the historical evidence as to the production of scurvy. He narrates many cases, and sums up his conclusions as follows: they are in accordance with the usual doctrines:—

1. Scurvy during the siege of Paris attacked only a small proportion of the civil population.
2. Overcrowding played no part in its production.
3. In a considerable number of the patients neither cold nor humidity excited any causative action.
4. Scurvy showed itself among persons abundantly provided with fresh meat.
5. None of the cases observed by Delpech were nourished habitually with salt meat.
6. The sole condition which was met with in all the observations was the want of fresh vegetables in the food.
7. Scurvy was principally developed in the public establishments—prisons, hospitals, workshops—where the number of persons did not allow fresh vegetables to be given.
8. It is then correct to consider the suppression of the vegetable aliment as having been (among persons mostly, though not all, enfeebled by other conditions) the only true cause for the development of scurvy.

In reference to this point, Dr. Gordon,‡ who was on special duty in Paris during the siege, states that scurvy prevailed among the various classes to a considerable extent, and that among the ordinary residents the disease was well marked. He also affirms that there were large stores of preserved meat in tins in Paris, but that after being used for some time this food ceased to satisfy. A feeling of hunger was constant, and the power of resisting cold and withstanding fatigue was lessened; dyspepsia and acidity were complained of, and emaciation took place in all.

We read this statement of course with the understanding that the quantity of preserved meat was as great as the fresh, but even then is it not possible that the real cause of mal-nutrition was the want of fresh vegetable food? Dr. Gordon does not draw any conclusion himself as to whether the preserved meat, when constantly used, is or is not nutritious; and it is not probable his readers can do so, though on the whole the evidence against the utility of the preserved meat does not, as the facts are stated, appear to be very strong.

*Food at Königsberg.*—On the food of the inhabitants of Königsberg, a work has been published by Schiefferdecker § which contains a good account not only of the food of the people of Königsberg but of other cities. Many curious facts are brought together with regard to the consumption, in different cities and countries, of meat, bread, beer, vegetables, sugar, tea, &c.

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* "Ann. d'Hygiène," publ. Avril 1871. † Ibid.

‡ "British Medical Journal, Sept. 16, 1871.

§ "Ueber die Ernahrung der Bewohner Königsberg," &c. Von W. Schiefferdecker. Königsberg, 1869.

Reckoning the mean consumption of all classes, and calculating the nitrogen and carbon, he gives the following Table :—

CONSUMPTION per Head Daily in Grammes.

| | Nitrogen. | Carbon. |
|---|---|---|
| Standard diet for a strong healthy man .. .. | 20·000 | 300·0 |
| In Königsberg, average diet in 1865 .. .. | 15·873 | 243·7 |
| „ Paris, „ „ 1860 .. .. | 18·363 | 242·6 |
| „ London, „ „ 1860 .. .. | 20·220 | 230·3 |
| „ Munich, „ „ 1860 .. .. | 20·120 | 277·8 |
| „ „ „ „ 1867 .. .. | 25·258 | 320·0 |

In Königsberg the bread gives the greater part of the nitrogen, as so much more bread is eaten than meat. The total vegetable albumen furnishes 7·879 grammes, and the animal albumen 7·994 grammes daily. The animal substances give 66·819 grammes of the carbon, and the vegetable 176·778 grammes.

In London the meat gives 8·5 grammes of nitrogen, and the bread only 5·760. The animal food gives 13·191 and the vegetable only 7·029 grammes of the total nitrogen.

The following Table may be interesting :—

| | Grammes of Nitrogen per Head Daily in | | | |
|---|---|---|---|---|
| | London. | Paris. | Königsberg. | Munich (1867). |
| Animal nitrogen .. | 13·191 | 11·202 | 7·994 | 16·427 |
| Vegetable nitrogen .. | 7·029 | 7·161 | 7·879 | 8·831 |

The vegetable nitrogen runs pretty equally, so that the increase from a diet poor in nitrogen to one rich in nitrogen depends on the addition of meat.

In reference to this subject the author inquires whether vegetable albumen is as nutritious as animal, and states that a Dutch physiologist (Croop-Copmans) has experimentally proved that vegetable albumen is as good and as quickly digested as animal albumen (p. 78).

From the whole analysis and comparison it appears that the food of the inhabitants of Königsberg is not good, and the author considers that this is one reason why epidemics prevail. He considers that the small nitrogenous supply must (according to Bischoff, Buhl, Ranke, and others) increase the amount of the water of the body, and occasion thereby a less contractility of muscles, and a disposition to many diseases.

### SEWERAGE.

The Report of last year dealt so fully with this question that little need be said this year. The illness of the Prince of Wales has brought out many letters on sewer ventilation. Many of them, though containing nothing novel, are able and practical; and it is probable that, for a time at any rate, the public attention will be thoroughly aroused to the dangers of badly-arranged and badly-kept underground channels.

The most important work which has appeared during the year is certainly the "Report of the Sewage Inquiry Committee of Birmingham," as it not only discusses the question of the sewerage of a large town, but also gives very accurate details of the plans both as to sewers and disposal of excreta in the other cities of England. Birmingham is in a position almost worse than any other town. The sewers contain the excreta of only a small part of the inhabitants, for 325,000 persons use middens, and yet the difficulty of getting rid of the sewage water is felt in the highest degree. After the fullest

consideration the Committee have recommended the adoption of a modified dry system, with weekly collection, for the large part of the town, where the house closets and middens are unconnected with the sewers, and of intermittent filtration for the sewer water. The sewers are also to be partially purified by excluding all refuse from slaughter-houses, cattle-markets, urinals, cowhouses, and stables; and also by keeping out all such chemical agents (as the refuse from the works of German silver manufacturers, galvanisers, wire-drawers, &c.) as interfere with the useful application of the sewage to land. Land to the amount of 800 acres is considered sufficient to filter the sewer water received from the houses of 345,000 people, which contains, however, the excreta of only about 20,000 persons. This is a great sanitary experiment which will be watched with the greatest interest. On the whole it seems the most practicable mode of dealing with the subject.

The amount of water supplied by the Water Company in Birmingham is for 240,000 people, about 35 gallons per head, or 840,000 gallons daily. The remainder of the population (105,000) are supplied from surface wells, and the amount is not known. All passes into the sewers.

### The Specific Diseases.

*Malarious Diseases.*—At the present time in India an opinion seems to be gaining ground that the prevalent notions about malaria require to be reconsidered; that "malaria" (if we use the term to express an agent causing a special disease) is much less common than is supposed; and that the mixing up of relapsing fever, typhoid fever, and perhaps other specific fevers with malarious diseases, has caused so much confusion that all old observations should be thrown aside, and the subject again investigated from our present standpoint of diagnosis in fevers. It seems only reasonable that some alteration must be made in the prevalent opinions of the extent of the action of malaria, yet it may be permitted to point out that entire scepticism is not justifiable. The class of fevers characterized by daily or alternate daily exacerbations and intermissions is remarkably well defined; the evidence connecting these fevers with some agency originating in the soil is conclusive; and the fact of paroxysmal fevers of this class being sometimes undoubtedly caused by impure water containing substances derived from the soil, proves beyond a doubt that a special agency of some kind must exist in the water.

The strength of the case which connects the cause of paroxysmal fevers with soil is best appreciated when any other explanation of these fevers is attempted. Dr. Oldham * has lately written a work to show that "malaria "as a specific poison does not exist," and that the "diseases usually attributed "to malarious influence are caused by chill" (*Preface*, p. vi). It is not likely that the case can be put with more ability than it is by Dr. Oldham in his very interesting work, but I doubt whether any one will consider his argument at all sufficient. Without, indeed, going into a discussion of instances for which this Report is not adapted, it seems fatal to his view (viz., that the "sudden "abstraction of heat" causes the paroxysmal diseases) that he is himself obliged to admit that there are malarious districts, and that both some marshes and some forests give rise to malaria (p. 34, *et seq.*). He is thus obliged to localize the causes, and though he labours hard to prove that in such places the liability to sudden chills is greater than in non-malarious places, it cannot be contended that he is successful. Take, for example, his own contrast (p. 34) between the highly malarious Terai and the non-malarious Punjab jungles. He does not expressly affirm that chills are more common in the former case, but he wishes this to be inferred; but would any one admit the explanation? It cannot be doubted that some material agency is given off in the Terai, which so often poisons those who sleep even one night there. The difficulties in explaining why one swamp, or one forest, or one sandy plain, should give rise to paroxysmal fevers, and other swamps and forests should not do so, is evidence of our very insufficient knowledge of the nature of the material agency of malaria, but it does not in the least overthrow the

* "What is Malaria? and why is it most intense in Hot Climates?" By C. F. Oldham, M.R.C.P.E., Assistant-Surgeon, Her Majesty's Indian Forces.

view that there must be such an agency. It appears to me that objection might be taken to the great prominence Dr. Oldham gives to every scrap of evidence (sometimes doubtful scraps) against the soil origin of the paroxysmal fever-making cause. His industry in collecting arguments favourable to his view is remarkable, but he has certainly not given equal weight to the counter-view. Has he not also sometimes spoken of fatal epidemic fever (probably of the severe relapsing form) as malarious, and has he given sufficient weight to what seems a fact, that though chills may not be able to produce a paroxysmal fever, they re-induce it easily when the fever has once attacked the body? The exposure of men who have been already subject to malarious fever in the plains, or on a Himalayan peak, may re-induce the paroxysm, but it is really not an argument that because there are no sources of malaria on the hills, therefere paroxysmal fevers arise only from chills.

The book is well worth perusing, for the industry and talent displayed in it are both great, but I believe the view propounded in it cannot receive general acceptance. Far greater difficulties exist in considering simple abstraction of heat as the cause of paroxysmal fevers than in the usual view of the existence of an as yet unrecognized earth-born, and air- and water-carried, miasma.

Some interesting observations on malarious sites in Assam and Demerara are communicated by Dr. S. Meredith.* Many instances of quite localized attacks of malarious diseases are noticed, and one of them may be cited here. At the Loajan tea-factory the labourers' cottages were erected in two rows facing each other, on a piece of ground about 50 yards wide and several hundreds in length, and situated on the left bank of the Shansi river. The back of one row of houses was towards the river, a few yards of space intervening, covered with shrubs, but no grass. The other row was towards the grassy ground; the jungle came quite up to the houses. All the houses were built of platted bamboo and thatch. The labourers were therefore of the same kind, living on the same food, and exposed to the same atmospheric conditions; the only difference was that one row was close to the jungle, the other at some little distance. The men in the row close to the jungle suffered much more from malarious diseases than those in the row of houses nearer the river.

Other cases of the same kind are noted, and also the shelter of close shrub jungle in some cases appeared to protect from malaria. Dr. Meredith believes that the opinion held by the writer of this Report, that while trees and closely-cut grass are good, jungle is bad, is not correct, and that well-kept jungle is useful. My observations, chiefly drawn from observations in Burmah, referred to the close jungle imprisoning masses of air, and enclosing a dank heavy atmosphere floating over decaying masses of vegetable matter. In Assam, grass from 3 to 6 feet high appears, from Dr. Meredith's observations, to be the most malarious, and it was to very similar physical conditions that my observations applied. If air passes tolerably freely through jungle it is probably not unhealthy; and Dr. Meredith cites instances where cutting away jungle produced malaria, and re-planting made the houses again healthy.

In many cases in Assam, dysentery and diarrhœa prevailed; and this was traced by Dr. Meredith to suspended decaying vegetable matters in drinking water.

Two instances of protection from malaria are recorded by Dr. Meredith. The charcoal-burners of different tea-gardens in Assam, who live near the pits and the charcoal, and who breathe an air strongly impregnated with the smoke and other products from the burning, "rarely suffered from malarious "complaints," and the cases of "anæmia and etiolation" were much less common than in other gangs of labourers. The second cases of immunity from malaria was in the labourers employed at the petroleum oil-springs at Marhum, above Jeypore, in Upper Assam. The smell of petroleum is everywhere perceptible. Fifty-nine men, women, and children, employed there for two years, had only one death—an old woman. There was no anæmia, and cases of malarious fever were only occasional, and were never protracted. Leeches, frogs, centipedes, lizards, mosquitoes, and sandflies rarely came within

* "Indian Medical Gazette," August, September, October, 1871.

the smell of the petroleum. The people did not suffer from ulcers following leech-bites, as is common in Assam.

Dr. Meredith also mentions that the labourers employed about sugar factories suffer little from malarious disease; and the sugar-cane, after being pressed (the so-called "megass"), has strong antiseptic powers.

*Cholera.*—Many important papers have been published on the origin and spread of cholera. Dr. Cornish has investigated the very localized outbreak among the 18th Hussars at Secunderabad, and has rendered it highly probable that it was a case of water-poisoning. The same author has also published an account of the cholera in Southern India, to which I hope to refer next year, as well as to Dr. Bryden's further statistics.

A Report by Dr. Douglas Cunningham on Pettenkofer's theory of cholera, and on the microscopic characters of cholera discharge, is published in the "Seventh Report of the Sanitary Commission with the Government of India."* The observations on the ground-water must be left for the present. The following summary of the microscopic observations is taken from the "Lancet:"†

*Microscopic Characters of Choleraic Discharges.*—"The second part of Dr. "Cunningham's observations is occupied with the microscopic observations "of the cholera discharges, and is illustrated by many beautiful plates very "similar to those in Dr. T. Lewis's Report of last year. He first gives tabu- "lated results of the microscopic examination of 100 cholera evacuations. In "only four of these was unmistakable epithelium to be found, and in only one "was it abundant. Without considering that he has exhausted the question, "Dr. Cunningham evidently considers the separation of the epithelium, of "which so much has been said, to be an immaterial occurrence. He states "that a cholera case may prove fatal with very little detachment and destruc- "tion of epithelium, and this may 'serve to suggest that such a process, "'though frequently occurring in the course of the disease or shortly after "'its close, may yet have no essential connection with the production of the "'characteristic symptoms' (p. 186). Red blood-cells were present in four- "teen cases; infusoria (exclusive of bacteria) in sixty-six, in the form of "cercomonads, peculiar monadiform bodies, and distinct amœbæ. These are "fully described and figured. With respect to the amœbæ it is pointed out "how difficult it is to draw the line between them and the human cells with "amœboid movements like the white blood-cells. In the cholera stools they "move and increase by division, and when in rows often resemble Hallier's "macroconidial chains; they are soon destroyed in the stools. On no occa- "sion has any transition from the monadiform bodies into amœbæ been noted.

"The bacteria and vibriones, and the 'micrococcus' and leptothrix of "Hallier are carefully described. In fresh evacuations they have been found "in a minimum of development. In any case of diarrhœa passing into "cholera, the progressive examination of the stools shows that bacteria lessen "in number as the disease advances. Their intimate connection with the "disease is therefore doubtful. As to anything specifically distinct about the "bacteria, no evidence was obtained by cultivation experiments; but Dr. "Cunningham has seen bodies discharged from oscillatorial tubes behave like "bacteria, and has seen distinct fungal cells arise from minute particles "agreeing with Hallier's description of micrococci. Herein his observations "do not seem in accord with those lately made by Burdon-Sanderson. Recog- "nizable fungi were only found in three of the hundred evacuations. Different "kinds of cysts are noted similar to those described by Lewis, and, in addition, "starch cells arising from dhâl grains (lentil) are stated to be sometimes like "the figures of cysts given by Hallier.

"The most careful cultivation did not produce the cholera series of Hallier. "Aspergillus was most commonly produced, and on one occasion a species of "eurotium. Penicillium was also seen, but was less frequent than aspergillus. "The following are the conclusions as regards fungi:—'1st. Distinct fungal "'elements are not common in, or characteristic of, choleraic evacuations. "'2nd. There is no special tendency to the subsequent development of such "'elements or their results in choleraic as compared with other decomposing "'materials. 3rd. There is no special form of fungus peculiar to choleraic

* Calcutta, 1871. † December 30, 1871.

" ' materials. 4th. The forms of fungi which appear as the result of the culti-
" ' vation of choleraic material, with or without the addition of other media,
" ' are merely those which are commonest on other decomposing organic sub-
" ' stances at the same season, and under similar circumstances. 5th. The
" ' members of Professor Hallier's cholera series of forms do not, in Calcutta,
" ' show so great a tendency to appear as those of other series do; mucor
" ' generally failing to occur at all, and even penicillium being comparatively
" ' rare, and quite subordinate to aspergillus' (p. 197).

" Both Cunningham and Lewis, therefore, agree in rejecting Hallier's state-
" ments on the cultivation of choleraic fungi; and so far this may, we presume,
" be considered almost decisive on the point; but we must not conclude that
" the question is yet entirely settled. After considering the fungi, Dr. Douglas
" Cunningham passes on to a very careful description of ' oval and circular
" ' cells,' which, with a gelatinous or molecular basis, he finds to ' really con-
" ' stitute the bulk of the white flocculent deposit of most choleraic evacu-
" ' ations' (p. 197). These cells occurred in eighty-seven of the hundred cases,
" and in the majority of instances formed the most characteristic features of
" the sediment. These cells are bioplastic masses, either at rest or exhibiting
" vital movements. As regards their nature, they may either be ' wandered'
" white corpuscles and bioplastic elements of the blood, or be formed by rapid
" development from the bioplasms of the mucus, gland, and epithelial cells, or
" they may be due to the development of foreign bodies of the nature of
" Beale's contagion bioplasms. Their exact nature is, however, left unsettled.
" Whether this immense formation of cells is an integral and important part
" of the choleraic process, or is a mere accident, Cunningham cannot at present
" decide. The above are the microscopical characters of choleraic discharges;
" but there may of course be miscellaneous microscopic bodies, such as entozoa,
" débris of food, crystals sometimes like blood-crystals, acari, and substances
" derived from impure drinking water.

" Such are Dr. Douglas Cunningham's microscopic examinations of the
" cholera dejecta; and even our short sketch will show how interesting his
" observations are, and how thoroughly well his work is being done. They are
" in excellent accord with the observations of his colleage, Dr. Lewis, pub-
" lished last year; and we are perfectly convinced that if he and Dr. T. Lewis
" retain their health, and are permitted to continue their researches, they will
" eventually clear up much of the mystery of cholera. It is quite clear that
" the exact nature of the oval and circular cells must form the subject of
renewed investigation by both observers."

*Cholera in Königsberg*—In 1871, cholera prevailed rather severely at Königsberg, and as, since 1831, there have been no less than 14 cholera epidemics in that city (viz., in 1831, 1837, 1848, 1849, 1852, 1853, 1854, 1855, 1856, 1857, 1859, 1860, 1866, and 1871). Some of these, as in 1854, 1859, and 1860, were very slight, but in 1831, 1848, 1855, and 1857, and especially in 1866, the mortality was considerable. It has never appeared before July, and almost always ended in November. It has never prevailed in Königsberg in February, March, April, May, or June. It will be interesting to see what are the causes which have led to this frequent occurrence, or rather to the lingering character of each epidemic outbreak, for the attacks in successive years are only revivals of a malady which has never become extinct.

The question of local conditions has been examined with very great care by Schiefferdecker,* who has assembled the statistics in each epidemic of the number of attacks, as well as of deaths; and, though absolute accuracy is not obtainable, still probably few statistical tables have had more care bestowed upon them.

The local circumstances are detailed with great care, and especial attention has been paid to the opinion of Pettenkofer:—

1. The Alterations in Level of the Ground-Water.—The rise and fall of the ground-water has been measured carefully in one place, (with a break of 27 months) from 1851 to 1866, and less carefully in other parts of the town. It appears that the level of the ground-water is very different in different

* "Die Cholera Epidemie in Königsberg." Von Dr. W. Schiefferdecker, Königsberg. 1868.

parts of the town, and while usually nearest the surface in the lowest part of the town there are some remarkable exceptions. The measurements showed also that the water in the several wells did not always show coincidence in rising and falling; in some wells changes in level were entirely dependent on rain; in other cases, the wells were under the influence of the river Pregel, which runs through the city.* The measurements show, in fact, how complicated the conditions of change are, and how very numerous and careful the observations must be to determine whether the ground-water is actually above or below its level over a wide area like that of a large city.

The influence of the rain on the wells was evident about a month after the fall, but this was only to a slight extent; two or three months were necessary for great changes in level. On comparing the changes of the ground-water with the outbreaks of cholera, the author concludes: "On the "whole, the observations at Königsberg are favourable to the ground-water "theory of Professor von Pettenkofer; yet it appears that the ground-water "relations are very complicated with us, as the several wells in the city differ "extraordinarily from each other, according to their position and the time of "year. A continued accurate observation is therefore necessary" (p. 142).

2. The Height of the Ground-Water and the Moisture of the Soil.—The districts with the highest ground-water did not suffer more than the districts in which the ground-water was much deeper from the surface. In other words, mere moisture of the ground exerted no influence.

3. The Rain-Fall, from an examination of all the epidemics until 1866.—The wettest months in the year are summer and autumn, and in these months the cholera has always appeared in Königsberg. It has appeared, however, in months with the mean amount of rain, or with an important excess or defect. Also the months preceding the epidemics have been normal, or very dry or very wet. On the whole, no immediate influence can be traced to the rain.

4. The Density of the Population.—In the most thickly populated part of the town (177 persons per acre) the attacks in 1866 were 375 per 10,000 inhabitants, while in another district where there were only 12 persons per acre, there were 777 attacks per 10,000; in another district, with 20 persons per acre, the attacks were 656 in 10,000. Surface crowding had, therefore, no influence.

5. The Condition of the Houses.—In the poor houses the living rooms and the kitchens are extremely small; the ground under them is damp and highly impregnated with impurities; the older houses have no cellars; the walls of the houses are damp; in winter the houses are never opened (p. 150). The excreta are mostly carried away in sewers; only in some exeeptional cases there are cesspits.

The statistics show that the cellar habitations furnished the largest percentage of cases (595 per 10,000 inhabitants); the ground-floor furnished only 298 attacks per 10,000, while, curiously enough, the first, second, third, and fourth storeys gave many more, viz., 404, 462, 533, and 571 attacks per 10,000 in 1866.

The comparatively small number of attacks in the persons inhabiting the ground-floor is, perhaps, to be explained by the fact that these ground-floors have special privies in the court, which are more or less removed from the dwellings.

The cellars of the fourth storey gave then the greatest number of cases but the cause is, perhaps, to be found less in the unhealthiness of their rooms than because the poorest families live in these quarters.

6. Elevation.—The rule given by Farr for London failed entirely at Königsberg. The highest part of the town (83 feet above the level of the Pregel river) gave 107 cases per 10,000 inhabitants, while the houses 10 feet to 20 feet above the level gave only 59·36, and those from 20 feet to 30 feet gave only 56·56 attacks per 10,000 of population. The reason of the highest part being attacked was partly because the population is dense, and partly because there are large almshouses, which were severely scourged.

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* In reference to the influence of wells by streams, it has been shown by Heis that a well 1,670 feet from the Rhine is influenced by the river.

7. The Ground.—The city of Königsberg lies in great part on a marshy alluvial soil; to the south of the river Pregel the smallest part is on diluvial sand, the highest part, to the north, is on a loamy soil. Parts of the town situated on the same soil suffered very differently; thus, of six districts on alluvial soil, two suffered less than the mean, two about the mean, and two severely. On the loamy and clayey soils, the district that suffered least and one that suffered greatly were situated. It is concluded with certainty that the ground exerted no influence.

8. The Drinking Water.—Königsberg is supplied with water from several sources. First, the River Pregel, which receives much of the drainage of the city (sewers and surface drains), as well as the excreta of all sailors in the ships lying in the river. So that Schiefferdecker concludes (p. 167) "that "Pregel water is not only in general impure and unhealthy, but must contain "during a cholera epidemic, the specific cholera-germ in great quantity, "whether this germ be a fungus or dead substance.

Secondly, the water of the "Oberteichs." This is an especial good and pure water at its origin, but in its distribution at one or two points is liable to be contaminated. Still, practically, it is a good water.

Thirdly, the water of the "Sprudleitung;" this also is a good water.

Fourthly, the water of wells sunk in the diluvium, and an Artesian well. The alluvial well water is extremely impure, since the ground is greatly contaminated with excreta, and is also often contaminated by surface washings and excreta, since the wells are often quite unprotected.

The following Table gives the attacks in different parts of the town:—

| Sections of the Town. | Water used. | Attacks of Cholera, per 10,000 Inhabitants. |
|---|---|---|
| Schlossfreiheit .. .. .. .. | Good water of the Oberteich .. .. | 122 |
| Steindamm .. .. .. .. | Ditto with some well water .. .. | 250 |
| Tragheim .. .. .. .. | Ditto .. ditto .. | 308 |
| Rossgarten .. .. .. .. | Ditto .. ditto .. | 326 |
| Alstadt, A. .. .. .. .. | Ditto .. ditto .. | 375 |
| Alstadt, B. .. .. .. .. | Ditto .. ditto .. | 400 |
| Löhenicht .. .. .. .. | Impure water of the Pregel or of wells .. | 570 |
| Kneiphof .. .. .. .. | Ditto .. ditto .. | 616 |
| Haberberg .. .. .. .. | Ditto .. ditto .. | 655 |
| Vorstadt .. .. .. .. | Ditto .. ditto .. | 656 |
| Königsshasse .. .. .. .. | Ditto .. ditto .. | 687 |
| Sackheim .. .. .. .. | Ditto .. ditto .. | 720 |
| Napier Garten .. .. .. .. | Ditto .. ditto .. | 777 |
| Mean of the city .. .. .. | .. .. | 500 |

Thus all the six parts of the town where attacks were below the mean were using the water which, good at its source, was here and there contaminated, while the seven other sections, using a bad water, all had attacks above the mean of the whole city. The result come out still more clearly when the districts are more closely examined, as it is shown that the parts affected were supplied with impure water, while, in several cases, neighbouring streets with an overcrowded poor population, but supplied with good water, escaped.

Dr. Schiefferdecker concludes this chapter as follows:—

"It is, therefore, evident that in Königsberg the bad water chiefly con-"tributed to the origin and spread of cholera. It must not, however, be over-"looked that in some houses more accurate investigation might yet have "found manifold causes for the spread, if, at the time, the circumstances had "been favourable for such investigation."

The whole inquiry is then summed up as follows:—

"The chief results are partly negative, partly positive. The condition of "the ground, its moisture, the elevation of the parts of the city above the

"water-level of the river, the height and roominess of the dwellings appear "to have exerted no decided influence on the origin and spread of cholera. "On the other hand, the following positive positions may be asserted:—

"1. The different ages of the people have an entirely different disposition "to cholera; little children and persons of advanced age are particularly "subject to the disease.

"2. Poverty, and the bad mode of life connected with it, are important "means of promoting the spread of cholera; especially the house-crowding of "poor families. Great almshouses favour this spread.

"3. The water of the Pregel river and of the shallow wells contributed "chiefly to the origin and spread of cholera, while the pure 'Oberteich' water "protected from it. What, therefore, we want in Königsberg to guard us "against cholera are healthy dwellings and good water."

This opinion, arrived at by so careful an analysis of all the Königsberg epidemics is of great value. It is impossible that even Pettenkofer can underrate the cogency of the evidence which brings home to the foul water by both positive and negative cases, a large share in the propagation of cholera. The work seems to us to strengthen very greatly the evidence for the water-carriage of the cholera-producing agency, while the facts which favour Pettenkofer's view of the effect of alteration in the level of the ground-water are comparatively weak and imperfect.

## Parasitic Origin of Disease.

*Stephanurus Dentatus.*—Dr. Cobbold, to whom we are so deeply indebted for his discoveries on entozoa, has made another observation which may turn out to be of great interest.* It appears that in 1834 an entozoon, which afterwards received the name of Stephanurus dentatus, was discovered by Natterer, in Brazil. After a lapse of 37 years, Dr. Cobbold received a letter from Professor Fletcher, of Indiana, with a re-discovery of this animal, which he found in the flesh of pigs, and which he thought might be the cause of the "hog-cholera," which has been so fatal to pigs in America during the last 10 years. Subsequently Mr. Morris sent home from New South Wales 24 micro-specimens of intestinal worms and insects, and among them was this "pig-worm," or Stephanurus

This entozoon is of large size, and is found especially, though not solely, in the fat of the pig in a free and encysted form, the latter being the final stage. In the cyst, three to six eggs are found, which eventually give rise to young worms, which migrate, and in their migration cause, it is surmised, the severe symptoms which are as common in Australia as in America, and known by the name of "hog-cholera." The cyst is large; one referred to by Mr. Morris was $1\frac{3}{4}$ inches in length and $\frac{1}{4}$ inch diameter. The full-grown worm may be as much as $1\frac{1}{2}$ inch in length; the female is the larger. It appears to be most easily found in the fat round the kidney.

Whether this animal is really the cause of the disease in pigs, or can produce any disease in men, is unknown.

*Fungi, as a Cause of Disease.*—The observations of Sanderson, in this country, and Lewis and D. D. Cunningham, in India, seem rather unfavourable to the idea that fungi distinctly recognizable as such, are the causes of several mortal diseases in man (though they are undoubtedly so in fishes and other animals). Some cases have been published in Germany which are of great importance as giving evidence an the other side.

*Intestinal Disease caused by Fungi* (*Mycosis intestinalis.*)—A very curious case is recorded by Buhl,† in which a man, aged 32, died with "vomiting and collapse" as essential symptoms. On *post-mortem* examination, 12 hours after death, some turbid fluid was found in the peritoneal cavity, and the retro-peritoneal tissue along the spinal column was red, ecchymosed, and highly œdematous. The walls of the stomach and intestines generally were also venous, injected, and œdematous. The mesenteric glands were also swollen

* "Monthly Mieroscopical Journal," November 1871.

† "Zeitsch. für Biologie." Band VI, p. 129. (1870.)

with spreading ecchymoses round them, extending into the folds of the mesentery. The mucous membrane of the œsophagus was unchanged; on the great curvature of the stomach there was a round, thickened, and prominent hæmorrhagic patch, with a navel-like depression, and a pale yellow centre. In the upper curvature was a similar spot; there was no loss of substance. In the duodeum, close to the pylorus, was another bloody, soft, lacerable spot, without destruction of tissue, so that confusion with simple ulcer of the stomach or intestines was impossible. From that point to the cœcum were 59 other spots of the same kind, making 62 in all. Interpreted simply by this examination, the cause of the vomiting and "choleraic-like "collapse," would have been considered to be the rapid peritoneal effusion and the acute œdema of the intestinal walls and retroperitoneal tissue; but on further examination an unexpected discovery was made. Buhl commenced the examination from the mucous coat, working out to the serous, and comparing every part of the patches with sound intestinal structures. There, in the soft parts, were layers of larger or smaller "zooglœa heaps"; these filled the villi, and the larger kinds formed the centre of the soft patches; the smaller kind were of hardly measurable dimensions. With a power of 800 to 1,000 diameters the cells were seen to have an oval form. Isolated corpuscles, either oval spores or conidia, were also seen, and had at one end a little budding corpuscle, as in customary yeast cells. No spores with cilia were seen with a power of 1-24th immersion lens. The substance of the villi was filled with fat globules and these isolated corpuscles. There were, in addition, fine jointed, but not branched, fibres lying on the villi and among the zooglœa heaps, and, apparently taking their rise from these heaps; the fibres were most numerous at the yellowish navel-like depressions. Although Buhl speaks with doubt on the point, it appeared as if the isolated corpuscles were derived from the breaking up of the fibres into their joints. It was clear that here was no peculiar fungus, but a plant of the same order as the group named by Nägeli and De Bary, "schizomycetes," where there is only terminal growth, but no branching of fibres, reproductive organs, or spore swarms.

On the hæmorrhagic points there were, of course, red corpuscles, but these were not only in the interstices of the mucous membrane, but in some cases distended the interior of the vessels.

The fibres were extremely numerous in the softened submucous membrane; they lay in the distended interspaces, but otherwise the histological characters of both mucous and submucous tissues were unchanged; colourless blood cells lay among the fibres and the blood vessels; especially the finest veins were filled with red and colourless blood cells. In the spot on the little curvature of the stomach the fibres had involved the serous membrane, and lay in a thick mass in it, and were at once distinguished from animal fibres. In the serous membrane of the small intestines the isolated corpuscles were more numerous than the fibres. The mesenteric veins were now opened with the greatest possible care, and the blood examined; the portal veins were followed deep into the liver, and the fibres were everywhere found. No fibres were, however, found in the blood of the spleen-vein, pulmonary arteries, coronary artery, thyroid vein, vena cava, or other vessels; but the corpuscles were found in the blood all over the body. Repeated numberings gave 350 of these conidia to 50 red blood-vessels and 1 white blood-cell. On the right side of the heart the corpuscles were more numerous than on the left, so that the passage of the plant through the liver into the heart seemed clear.

The swollen mesenteric glands and the lymphatic glands behind the peritoneum contained unheard-of quantities of fibres; it seemed as if there were nothing but fibres and enlarged lymph corpuscles in the glands.

After describing all these points at length, Buhl concludes, "It appears "now no more doubtful to what we should ascribe the œdema of the intes- "tinal wall, of the mesentery, and of the retroperitoneal tissue, as well as, "lastly, the exudation in the abdominal cavity. The abundant penetration of "the plant fibres into the portal vein, and in the lymphatic vessels of the "portal system, clear up perfectly the relations already noted. The cholera- "like symptoms were the consequence of the mechanical working of the "plant, the blockage of the portal blood and lymph stream, and the consequent "transudation" (p. 136).

This appears to be one of the most important observations lately made—the man was actually killed by the mechanical action of a rapidly-growing plant, and the symptoms were remarkably similar to those of cholera.* So that this case, if it stood alone, would be of the greatest interest, but it acquires ten-fold importance from an essay lately published by Waldeyer.† This observer, in 1867, made a *post-mortem* of a case of a man of 30 years of age who was attacked by severe gastralga followed by vomiting, purging, and then an exceedingly marked cyanosis and asphyxia, which killed him in two days. The *post-mortem* examination presented appearances identical with those of Buhl's case, and on microscopic examination, besides blood-corpuscles, there were found in the soft hæmorrhagic patches quantities of amorphous finely-granulated masses. The stomach and intestines were preserved in alcohol, and on the publication of Buhl's case, were re-examined. Then zoogloea heaps, quite like those described by Buhl, were found between and among the villi; the oval corpuscles were also found.

To these two cases Waldeyer is able to add a third, which, in some respects, was different in symptoms. A man, aged 40, was brought into hospital covered with numerous papulæ and blood pustules, which, at first, suggested the diagnosis of variola hæmorrhagica, or of malignant pustule. There was no vomiting or purging, but high fever, excessive stomatitis, and bad-smelling breath, great cyanosis, and splenic swelling. In addition to numerous other conditions, there were red and swollen patches in the stomach and intestines, and great swelling of the mesenteric glands. On microscopic examination of these patches and of the blood, exactly the same appearances were seen as in Buhl's case. In the branches of the portal system, and in the liver branches of the same, were enormous quantities of zoogloea-heaps and long thread-like formations arranged in chains; long and short pieces of these fibres, exactly resembling customary bacteria were also found in great quantities. In the vessels of other parts of the body there were no fibres, but an immense quantity of little zoogloea elements. The little vessels were blocked, thrombus-like, with these fungus elements in the skin, heart, liver, intestines, kidney, lymph glands; so that all the ecchymoses were traceable to fungus-embolism, so to speak. In the swellings on the skin, the lymphatics were blocked with colourless blood-cells, between which the fungus-elements lay, and this condition caused the papulæ. The case of the bloody vesicles was not so clear.

The patient was a butcher, and the idea of splenic apoplexy (milz-brand) seemed very probable.‡

Comment on this case is not necessary; it is clear that the so-called zoogloea (so named by F. Cohn) was really the efficient cause of all these symptoms, and the publication of three cases so similar in their cause in so short a space of time proves that "mycosis" (if this term may be allowed for bacteridia or zoogloea) is not an uncommon condition. A fresh impetus must be given to the thorough investigation, with the highest powers, to the enquiries now going on in India.

*Microzymes in Metastic Abscesses.*—Von Reckinghausen, whose authority as a microscopist and pathologist is very great, has lately asserted§ the cause of little abscesses in the "entire range of infectious diseases, above all, of "pyæmia and puerperal fever, typhus, acute joint-rheumatism, urine-infiltra-"tion, and lung-gangrene," to be miliary collections of "little organisms" which are identical with the "micrococci" of authors. These microzymes were most common in the kidneys, and especially in the blood-vessels—the veins particularly. They were found, however, inside Bowman's capsules, and in the tubercles.

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* It would of course be improper to generalize from a case of this kind occurring in Europe to cases of Indian cholera, but it is clear that the part which fungi, or I should, perhaps, say Schizomycetes, play in cholera is not settled yet.

† Virchow's Archiv. Band LII, p. 541. (1871)

‡ Waldeyer refers, in a postscript, to another case, in which he found pigmented bacteria-colonies in both kidneys.

§ "Centrablat für die Med. Wissensch." November 1, 1871, p. 713.

*Microzymes in the Skin in Small-pox.*—Weigert* has discovered in the skin of small-pox patients after death little vessel-like passages of ·01 to ·02 millemetre diameter, with contents exactly resembling bacteria. Weigert is inclined to think the little passages were blocked up lymphatics. The bacteria were in three places, in the neighbourhood of the pustules, in the tissues under or in the periphery of the pustules, in the hæmorrhagic patches without, or with only imperfectly-developed pustules. The bacteria lay here in the deeper strata near the subcutaneous tissue, in which were also arteries blocked with bacteria. What the exact importanee of the presence of these bacteria may be remains to be determined hereafter.

### The Intimate Nature of Contagion.

In last year's Report, I noticed the investigation on the nature of contagion commenced by Dr. Burdon-Sanderson at the instance of Mr. Simon. Before going any further, Dr. Sanderson has found it necessary to clear up some points connected with the origin of bacteria, and a careful inquiry is given in a late Report.† He has used for this investigation Pasteur's fluid, the composition of which has been given in the section on water. By introducing into this liquid, with proper precautions (such as boiling the liquid and heating the tube), a few drops of a suspected fluid, he is able to determine if microzymes (*i.e.*, bacteria) or their germs have been or not contained in this fluid. The greatest result of his experiments is to show that bacteria are not developed out of, nor, in their turn, can they give rise to torula cells, or any form distinctly recognized as fungoid; their origin Sanderson leavesdoubtful, but is strongly disinclined to admit that they spring into existence of themselves; nevertheless, they have as yet been looked for in air without success; and liquids, presenting no particle discoverable with the highest power, have yet given rise to them in Pasteur's fluid. Sanderson, therefore, infers that they arise from particles so minute as not to interfere with the homogeneity of the fluid. Moreover, the electric beam of light, as used by Tyndall, does not detect them. They are of nitrogenous composition, but take their nitrogen apparently not from albumenoid substances, but from ammoniacal salts; they require oxygen, and if deprived of it, at first become sluggish, and then motionless. They are capable of exciting putrefaction in liquids, but Sanderson concludes that "the facts do not afford ground for stating that they are the "cause of putrefaction."

The most important statement in this paper is that there is no developmental connection between torula cells and microzymes; in no case, when it was certain that true fungoid elements could be excluded, did torulæ appear, and when microzymes were excluded, fungi developed through all their stages without the appearance of bacteria. In this respect, Sanderson is at variance with Hallier.

How far these investigations will throw light on the phenomena of contagion it is impossible yet to say, but they were evidently quite necessary before the research into the contagions agents could be successfully undertaken.

Dr. Beale's two works‡ are distinguished by the beautiful plates which enable his statements to be followed so easily. He discards in these works the terms "germinal matter," and replaces it by what seems the much better term of "bioplasm." A great part of his second work is taken up with a careful description of bioplastic forms and their modes of growth, which is given with great precision. The agents of contagion are considered to be minute particles of bioplasm, which can be seen under the microscope in vaccine lymph, variolous pus, blood serum of cattle-plague, &c. These little particles present no microscopical features which would enable them to be identified as

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* "Centralblatt für die Med. Wiss." September 30, 1871, p. 609.

† "Appendix to the Thirteenth Report of the Officer of Health to the Privy Council." 1871. Reprinted in the "Quarterly Journal of Microscopical Science," Vol. XI p. 323.

‡ "Disease Germs: their real and supposed nature." 1870.

being connected with any particular disease. That these particles which can be seen in a vaccine vesicle or small-pox pustule, however, give those diseases and no other, is considered certain, and hence Dr. Beale considers himself justified in concluding "that they consist of a peculiar kind of living "matter, the smallest particle of which, when supplied with its proper "pabulum, will grow and multiply, giving rise to millions of little particles "like itself, each having similar properties and powers." These particles are living, but they do not, according to Beale, assume any special form; they are not, for example, microzymes, or any vegetable life; they are minute particles of animal origin and can be identified merely by their effects.

The distinction between these little particles of bioplasm and the almost equally minute bacteria may seem to some to be a refinement, and indeed Richter, in the essay already referred to, puts down the "germinal matter" of Beale and Morris as a synonym of the micrococcus of Hallier, the microzyme of Béchamp, and the bacteridia of other authors. But this seems to be an error. Microzymes have a recognizable form, and can be named; the bioplastic particles, which Beale considers to be the "contagium," have no such character. The two substances may be entirely different.

On this subject two other works may be referred to. Dr. Dougall* has made many experiments on the strength of the solution necessary to kill or to prevent the growth of bacteria, torulæ, &c. The magnifying power used was 711 diameters. I extract a few facts only from his Tables. The metallic salts (sulphate of copper especially) are the most powerful agencies. Nitrate of silver is less potent than others, owing probably to its easy decomposition by light and chlorides. Arsenious acid had a power inferior to sulphate of iron, which itself does not stand very high among the metallic salts.

Hydrocyanic acid has a very great power, and so also, though inferior to it, have benzoic and picric acids, while carbolic acid was found to be far less efficacious.

Sulphurous acid stands low; bichromate of potash, and especially chromic acid, acts very powerfully, and Dr. Dougall believes it will be brought into practical use, as it has double the antiseptic power of carbolic acid. Still questions of expense and of facility of usage will, perhaps, always give the palm to carbolic acid. Chloride of aluminium was very potent; the so-called chlor-alum (owing to dilution, apparently) was inferior.

From his experiments, Dr. Dougall concludes that "it does not appear "that germs are the cause of putrefaction;" on the contrary, he thinks they rather prevent it, and he adopts the view that putrefaction is caused by oxygen. But how, then, does he get over Pasteur's experiments?

Dr. Calvert† has published some experiments on the effect of heat on "protoplasmic life." The experiments show that a temperature of 400° Fahr. kills all life. At 300° Fahr. bacteria or vibrios will still move, though many are killed: a temperature of 200° has little effect. Dr. Calvert makes a distinction between vibrio and bacteria, applying the latter term apparently to the long rod-like bodies.

### Marches and Knapsacks.

In the late Franco-German War very long and difficult marches were done by the Germans, and in part their astonishing success seems to have been owing to the superior physique of the men. Dr. Roth,‡ who served as Chief Medical Officer with the Saxon Army, mentions that the 18th Division marched, from the 29th October to the 17th November, 55½ German miles, which is equal to 260 English miles, or 13 miles a-day. On another occasion, the division marched 160 English miles in 9 days, or nearly 18 miles a-day; while, on the 16th and 17th December, in the various manœuvres about Orleans, they marched 54 English miles. They were very heavily accoutred, and the roads were bad, so that these marches are among the most fatiguing on record.

* "On the relative power of various Substance in preventing the Generation of Animalculæ." London. 1871.

† "Chemical News," August 1871.

‡ "Deutsche Vierteljahrs, für öffentl. Ges." Vol. 3, 1871, p. 62.

A march of a small party of French was narrated by an officer of the party who was afterwards wounded at Sedan, to Dr. Frank, who has kindly given me the particulars. A company of a regiment of Chausseurs of Macmahon's army, after being on grand guard, without shelter or fire, during the rainy night of the 5th–6th August, started at 3 in the morning to rejoin its regiment in retreat on Niederbroun, after the battle of Weissenburg. It arrived at this village at 3·30 in the afternoon, and started again for Phalsbourg at 6 o'clock. The road was across the hills and along forest tracts, which were very difficult for troops. It arrived at Phalsbourg at 8.30 o'clock in the evening of the next day. The men had, therefore, marched part of the night of the 5th–6th of August, the day of the 6th, the night of the 6th–7th, and the day of the 7th till 8·30 P.M. The halts were 8 minutes every hour, from 3·30 to 6, one hour in the night of the 6th–7th, and 2½ hours on the 7th. Altogether, including the halts, the march lasted 41½ hours, and the men must have been actually on their feet about 30 hours, in addition to the guard duty on the night before the march. The exact distance is not known, but considering the extreme difficulty of that rugged mountain country, and the bad weather this is, perhaps, the most toilsome march on record.

Roth particularly remarks on the bad effect produced on all by stragglers during long marches. In order to prevent the sight of fatigued men at the side of the road, every regiment in the Saxon Army was followed by a "Kommando," consisting of a Surgeon and two hospital aides, with a wagon for the transport of the fatigued men or their knapsacks; in this wagon and issued when necessary, water and wine was also carried.

In all their marches the Germans carried their knapsacks; in the cold weather blankets were issued, and Roth says that this was such a comfort that the additional weight was borne without a murmur. With regard to the German knapsack, he writes (p. 67):—

"Whether the experience of this war will bring nearer for our troops a "better arrangement of the weight of the knapsack we cannot say, but we "sincerely hope that this question may be closely considered, for the best part "of marching power of our Infantry was absorbed in bearing the weight of "the pack. The last English attempt which, as far as we know, gave favour-"able results when it was tried in the 2nd Regiment of the Guard, will, "perhaps, after the war be taken into consideration."

In respect of the pressure produced by the straps of even the Prussian knapsack, which is known to be a very good one, some observations have been published by Heubner,* of Leipzic, who was in charge of the Reserve Hospital in that city from September 1870 to March 1871. During this time a number of men were sent from the army as inefficient, whose cases were quite new to the civil practitioner, but which were eventually traced to the effects of the pressure of straps. The matter has great military importance, so I translate some of Heubner's observations:—

"It is very difficult for a physician, accustomed during a number of years "exclusively to hospital practice, and therefore to treating chiefly severe "cases, or at least such which manifest anatomic changes corresponding to "the subjective complaints of the patient, to believe in the existence of some "morbid affection, if he is unable to prove any evident alteration. Certainly "among the innumerable so-called 'slight sufferings' which pass through the "hands of a practical physician, there are not a few which either in the com-"mencement, or also during all the time of treatment, hardly admit of any "somewhat assured anatomical diagnosis, and with the symptomatical deno-"mination of which he must rest satisfied.

"A very considerable number of cases of this description occurred during "my practice in the Reserve Hospital (Barrack Hospital at Leipsic). By the "side of severe cases of typhus, dysentery, &c., there appeared also a number "of other patients who, on being asked, stated they were suffering 'from the "'chest,' 'from the stomach,' or from 'cramps in the stomach,' or from 'the "'liver.' On further inquiry it frequently resulted that, besides *the pain* "which they held out as the chief complaint, there was an absence of further "symptoms which usually lead to the conclusion of an affection of the chest,

* "Archiv. der Heilkunde." 1871, p. 340.

" such as cough, characteristic expectoration, cramps in the side; or of an " affection of the stomach, as for instance want of appetite, lancing pains, eruc- " tations, nausea, vomiting, &c.; and that, on physical examination afterwards, " it was utterly impossible to diagnose either a bronchitis, or any other affec- " tion of lung or pleura or stomach. Really I was frequently at a loss what " name I should dictate to my assistant. One man was inclined to call the " complaint 'rheumatism'; another 'dry pleuritis' (*sicca*), without being fully " convinced of the correctness of his view. Frequently I really felt inclined " to consider those subjective complaints of the patients as at least exagge- " rated, if not as pretended, and thought them to be 'simulations.' Never- " theless, in the course of time I noticed a very great similarity of these " complaints in individuals of very different kinds, and differing also extremely " in their general behaviour. Besides, it was hard to assume that such " patients had passed through the hands of Military Surgeons, and afterwards " through various hospitals, without being found out. Moreover, it occurred " that such patients, when discharged and sent back to their regiments by " Surgeons of the same way of thinking as myself, were compelled to stop " and return, because they were simply 'unfit for service.'

" At last the peculiar progress of some affections of the respiratory organs " which I could trace, led me to the consideration whether a certain external " cause, traumatic in its widest sense, might not be at the bottom of such " illnesses. In the next place I was surprised that, among the cases of true " pleuritis which came under my observation, there were a great many of dry " pleuritis with friction sound only, without liquid effusion; and that whenever " exudation existed there were in every case muffled sounds over a surface of " a hand's-breadth only, either on one or the other side of the back, and which " did not enlarge under observation. I was also struck by the non-occurrence " of a single fully-developed pleuritic effusion among all the cases of pleuritis " brought in till the month of February (six months). Moreover, a few of those " exudations, and even one affection of the lung itself, had characters totally " different from the usual ones, namely, a muffled sound along the sternum, " reaching high up over the heart, but very little extended on the side and at " the back. This reminded me naturally of the position of the strap which " holds the knapsack. I considered now the kind and the possibility of an " effect produced by the continued pressure on the thorax, and came to the " conclusion that in the numerous cases of so-called 'chest affection,' intense " pressure, acting on various tissues, might very well explain the symptoms " observed. Numerous questions addressed to the single patients, and pointing " in this direction, confirmed more and more my view.

" The weight which the foot soldier has to carry during the march, on the " upper part of his body, amounts to about 60 lbs., inclusive of knapsack, " side-arm, ammunition-pouch, and rifle. (Those figures are not official, but were " uniformly given by numerous soldiers.) The knapsack is so carried that its " weight is suspended by two straps which pass both over the shoulders, the " front wall of the thorax, and the side; and the straps, after passing the " shoulder, divides about the fifth rib into two branches, of which the one is " attached to the belt which carries the side-arm and pouch; the other runs to " the lower end of the knapsack. In the first case the strap passing over " the thorax carries the knapsack only; in the second case also a part of the " weight is suspended from the belt. The pressure exerted by the strap, " under the weight of the knapsack on the thorax, must therefore differ. In " the first case a nearly equal pressure, corresponding to the weight of the " knapsack, is produced on all parts lying in a line running first " outward from the nipple line, or even in this line, and then cuts the " side wall of the thorax in the middle. The share for each side would be " about 17 lbs., but this pressure is only approximatively equal. The knapsack " of a man, when standing, tends to fall perpendicularly downwards; but on " the march it would fall obliquely downwards and backwards, if it were not " supported; and therefore the chief pressure on the upper part of the strap " will not be exerted, while the knapsack itself will press, for the same reason, " most on the lower parts of the place on which it lies, *i.e.* on the lower third " of the back of the thorax.

" In the second case, in a soldier on march, the weight of the knapsack

" which is carried by the lower part of the back has to be deducted from the " pressure taken off the thorax through the tendency to fall.

" The ammunition-pouch, placed about the region of the left hypochon- " drium, and the side-arm, exert their own pressure on the belt which en- " circles the body, and especially in a direction from above downwards, so that " the lower margin of the belt is pressed more inwards than the upper one. " The belt besides, through its tight buckling, causes a special pressure on the " circumference of the waist.

" In the second case the strap over the thorax carries, in addition, a part " of the weight attached to the belt, and this increase of weight will chiefly " occur on the left side, because of the larger weight being placed there; " therefore not only the upper part of the left thorax is engaged, but the whole " region corresponding to the papillary line.

" Those parts of the trunk which are chiefly liable to suffer from the " pressure are the front parts of the walls of the thorax corresponding to the " papillary line; then those parts of the sidewalls which pass obliquely over " the ribs; further, the lower thoracic part of the back, the peripherical line " round the waist over liver and stomach, and of those parts situated on the " left side, from reasons above stated, are more liable to injury than those on " the right side.

" These are just the parts to which such 'chest patients' which cannot " show any palpable lesions of the chest referred their pains, if an opportunity " is given them to fix more closely their indications; and in the most frequent " cases they indicate the left side of the thorax, rarely the right, also chiefly " the exterior half of the thorax, the lower part of the front and side walls. " In the next place the region of the liver, of the stomach, and the left side " region of the trunk.

" On inquiring further, what are the organs causing pain or pressure, we " have to put aside the skin and the cellular tissue, because, even through " continuous pressure, pain cannot be evoked before the skin becomes excori- " ated; but on no one of the soldiers could I see any erosions of the skin, " which circumstance admits perhaps of explanation, through the tunic pre- " venting real friction. The absence of any such erosions, &c., as occur rapidly " enough on the feet, has no doubt retarded the observation of the exterior " symptoms of such kind of 'chest sufferers.'

" If in the skin and the cellular tissue underneath, even the existence of " small hæmorrhages does not cause special sensation of pain, the same is not " the case in the muscles. Here a persistent pressure can produce either " partial ædemæ or small hæmorrhages, or perhaps real contusions of muscular " fibres, or even the appearance of hyperæmic tracts and hæmorrhages in the " fibrous tissue of the fascia, and as a consequence thereof pain in the " muscles.

" Every man who ever made pedestrian tours, and carried some luggage " with him, will recollect that in the evening the muscles of the chest and " neck feel tired in the same degree as the muscles of the feet, although the " former had no active movements to perform.

" Therefore *a certain number of those so-called 'chest patients' suffer from* " *affections of the muscles of the thoracic and abdominal cavity*, and especially " from those muscles situated at the above-mentioned places, *i.e.* the *musculus* " *peet. major* and the upper ends of the *musculi recti* and *obliqui externi*, which " are reached by the belt. In numerous single cases I was able to discover " in the muscles the seats of the pain, either by pressing the quiescent muscle " or oftener the muscle when in motion. This pressure pain, which ought not " to be felt when a fold of the skin over the muscle is lifted up, is at the same " time a safe criterion for the diagnosis, and for the estimation of the extent " of the lesions, and has especially led me to an insight of this peculiar kind " of affection, which is confined to the above-mentioned places liable to suffer " from pressure.

[The author quotes here the medical history of a few cases. In all of them the muscles of the thorax and abdomen were painful by touch, pressure, percussion, or movement.]

" All these affections were rapidly cured by sufficient rest. All other " organs of the patients were healthy.

"The patients' own reports confirmed my view. They distinctly asserted "that the pressure of the leather belts had become to them specially onerous "and unbearable; that in the beginning they had experienced only slight "pains, which disappeared as soon as they had put down their knapsack, &c.; "but that these pains had re-appeared stronger and stronger every time they "had to put them on again, till at last they were quite unable to carry their "accoutrements.

"Another tissue, which occurs at the above-mentioned places, and which "is liable to be injured by pressure, is the *periosteum* of the single bones, "namely, of the clavicles and of the ribs in the side wall of the thorax, all "only slightly covered with muscles. A frequent complaint was 'rheumatic "'pains' in the shoulder, in the sides, in the ribs, &c. On examination "nothing could be found beside the pain, or perhaps a slight swelling.

"The effects of continued pressure were also noticed on such parts where "the interior organs are protected only by muscular textures, as in the "epigastrium and on the margin of the thorax. The effect of tight lacing, as "producing slight chronic inflammations of the liver, is sufficiently known. "The heavily loaded belt, which has to be continually carried, perhaps for "months, will naturally have similar results. Many of the 'chest patients' "complained of pain at the upper region of the liver, of a heaviness in their "belly, especially after meals, but without loss of appetite.

"The effects of long pressure on the pleura and other organs in the thoracic "and abdominal cavity are not so easily to be followed. The Military Surgeon "on the march is frequently appealed to for 'heaviness of chest' or 'difficulty "of breathing.' He has to guard himself against deception. In delineating "the really painful parts he must find them to be under the straps, or he "cannot admit them at all; but when he finds the coincidence and the painful- "ness under digital pressure, he had better give the man relief from carrying his "accoutrements, but need not send him away, because a few days of rest will "restore the man. In slighter affections he may better tell the man that with "some precautions his constitution will get accustomed to the pressure, and "encourage him rather to go on with the prospect of hardening his body than "to think of going to hospital.

"In rare cases the complaints of such men are of a nature as to let the "Medical Officer think of an incipient phthisis or heart disease, of ulceration "of the stomach, and such like; but after examination they are not found "to be more ill than footsore men, and as three days' rest will enable them "to rejoin their regiments it will be unnecessary to send them to a reserve "hospital."

### War Hospitals.

A great number of essays have been published on this subject,* from which I extract a few of what appear the most interesting points. The Germans had first their field hospitals for the immediate reception of their wounded and sick. In rear were the stationary field hospitals, and on German soil were vast numbers of reserve hospitals established close to the frontier, and also in almost every considerable town in Germany. Most of these stationary and reserve hospitals were made of wooden huts, or partly brick and wooden; in some cases they were tents.

The mortality from pyæmia was very great in many hospitals, even in some of first-rate hygienic construction and administration, while in other cases there was less pyæmia; and a good supply of air appears to have entirely checked hospital gangrene, and other infectious diseases.

In the management of their hospitals it is impossible to doubt that the Germans were far superior to the French, and as an instance of this I extract the following account† of the German and French hospitals at Amiens:—

"The third field lazareth of the 8th Army Corps (Rhine Provinces) was "established at Amiens after the battle of Villars Bretonneau (29th November,

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* Mr. Berkeley Hill's "Lecture on the Hospital Transport Arrangements" gives a very good account of many of the plans.

† From the "Kolnische Zeitung," 14th April, 1871.

" 1870), when the greater part of the advancing German Army of the North " turned westward, marching south of Amiens toward Rouen. The citadel of " Amiens was then still being bombarded, and the town, just being occupied " by a small detachment of troops, was exposed to stray projectiles from the " citadel ; the heavy corps hospital arrived, and entered into *pour-parlers* with " the municipal authorities about an appropriate permanent locality for its " international work of humanity.

" After considerable opposition the Municipal Council consented the next " day to entrust the keys of the 'Musée Napoléon' to the Hospital Directors. " On the 1st December the *personnel* belonging to the hospital took possession " of the magnificently furnished rooms of this palace, which had been erected " in 1854 to 1864, under the auspices of Napoleon III., and the Geneva flag " was planted on the great central dome of the building.

" The same corps hospital, before coming to Amiens, had been working " during two months at Marigny, but under much less favourable circum- " stances. The soul of the lazareth and of its sanitary activity has been at " both places Dr. Kreutz, Staff Surgeon and District Medical Officer of Health " of Montjoie. Guided by the principles of advanced hygiènic science, he " knew how to avail himself of all the favourable conditions of the locality, so " that the Napoleon Museum Hospital may be considered as a model hospital " of the German Army of the North.

" In the beginning Dr. Kreutz chose for his quarters the reception hall of " the left wing of the Museum, where Dr. Hillenkamp has at present his " orderly Medical Officer's room.

" The sanitary measures were greatly favoured by a system of hot-air pipes " which spread an agreeable temperature uniformly through all zones of the " wards, producing nowhere local gulf-streams in the air.

" In the picture galleries, now converted into sick rooms, the double roofing " of glass provided an excellent system of ventilation for all the rooms of the " upper floor. The lighting of these galleries is effected from the roof, namely, " by means of a complete glass pavilion, which, extending over all the rooms, " both square and circular ones, forms, by means of its glass floor, the ceiling " of all the rooms underneath, and the side walls and ceilings of which project " into the air like a cap of glass 5 feet high. By removing systematically some " of the glass plates from the upright side faces, and from the horizonal floor " of this pavilion, a continuous change of air was obtained, the stream of " which, being broken inside the pavilion at right angles, was rendered " gentle. Even during the long lasting extraordinarily severe winter, these " measures were carried out with an unswerving rigour by the hospital " police, who, guided by an intelligent practical man, arrived at a decided " success.

" With regard to the lofty rooms on the ground floor also, care was taken " to ensure a continuous uninterruptible passage of the air. Suppose a man " were led with his eyes bandaged, at night or day time, into any of the rooms " of the Museum Hospital, it would have been impossible for him to distin- " guish, by the sense of smell, whether there were in the room any people at " all, or some wounded, or a considerable number of wounded in the suppu- " rative stage. An air completely spring-like prevailed in all the rooms ; and " although it was necessary, on cold winter nights, to assist the hot-air warming " by increasing the number of blankets in these as it were breathing (unceasingly " aspirating) rooms, the problem was solved to supply, for the wounded soldiers, " a sanitary locality free from epidemics during all the winter, notwithstand- " ing the inevitable overcrowding. This proves that an important result, even in " a foreign land, was obtained ; and I do not exaggerate by asserting that all " French (ambulances) temporary hospitals at St. Quentin, where the science " of air dietetics was not only entirely ignored but much sinned against " turned out, when compared with the Amiens hospitals, to be establishments " for infection. I had opportunities to observe daily, at 8 A.M., the cold " window-panes covered with big drops of a fluid condensed from the exhaled " vapours inside. Such occurrences, next to the sense of smell, give an unmis- " takable hygrometric indication of the infected state of the air. Two hours " later, when the stoves had been relit, the window-panes had dried again, " and the foul liquid was re-evaporated into the overcharged atmosphere of

" the room. Several times did I venture to remind the French Surgeons of " the words of their countryman (Régnard) :—

" Qui ne rirait de voir qu'avec un soin extrême
L'homme ait inventé l'art de se tuer lui même!"

" The melancholy results of hygiènic neglect in St. Quentin did not fail to " make their appearance soon, although the hospitals remained there only a " short time. Only three weeks after their opening, pyæmia and hospital " gangrene prevailed there, and finished off the wounded as victims of crudest " ignorance.

" In comparison to these undeniable mistakes against hygiène in the French " hospitals, therefore, the activity of the German field hospitals deserves to be " acknowledged.

" For the cleansing of floors and furniture in the Museum Hospital at " Amiens a special set of servants was hired. This measure for keeping a " hospital healthy must by no means be underrated. The daily removal of " layers of dust from all corners of the room deprives the spores of pencillium " and other dustlike fungi, which turn out so injuriously to the healing of " wounds, of the soil to fructify in. In the large yard of the Museum a free " standing house was erected of boards. The larger part of the latter served " as a general kitchen, the smaller one as a wash-house.

" From the 1st to the 15th December chiefly sick soldiers had been treated " in the Museum Hospital. After the latter date, evacuation of severely " wounded to Amiens from Sains, Drury, and Hebecourt took place; and " although in former times especial care would be taken not to accumulate in " a hospital such wounded as require secondary treatment in the suppurative " stage, necessity compelled us to do so in this hospital. It need not be repeated " that, according to experiences made in old-fashioned hospitals, it was ex- " pected that the wards of the Museum Hospitals would soon be infected, and " then predispose to the development of epidemics; but it must be set down " as a glorious fact, that for all that not a single case of pyæmia by infection " has occurred, although this disease prevailed greatly in the neighbouring " French hospitals, which took in only primary cases.

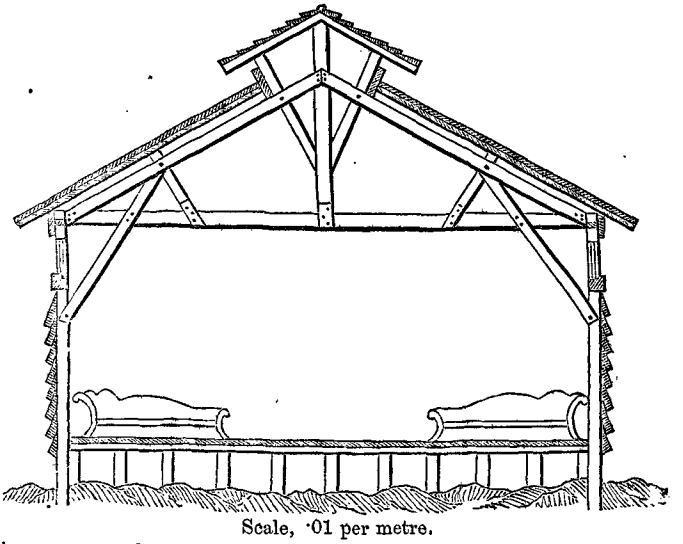
" The principal period of the activity of this hospital began in the night " of 23rd to 24th December, when, after the battle of Querrieux, 300 wounded " were brought in, and during the three following Christmas days continually " fresh numbers arrived. The wounded, just coming direct from the bandaging " station of the battlefield, were in want of everything, as food, beds, and " operative treatment. Trusting to the above-described prophylactic hygiènic " arrangements, the Military Surgeons did not hesitate a moment to place the " new arrivals, contrary to preconceived opinions, under the same roof with " the already installed typhoid and dysenteric patients. The rational ad- " ministration of the hospital mastered completely the type of the disease in " the whole building.

" The sanitary trains which arrived at Amiens from Germany in the last " days of December had scarcely decreased the number of wounded in the " hospital, when Faidherbe's army threatened to cause a fresh sanguinary " supply. The battle of Bapaume (3rd January), the German occupation of " the line of the Somme, and the consequent abandonment of the territory in " the German front, were hard moments which caused, during those four or " five days, an overwhelming supply of wounded to the hospitals of Amiens. " On the 3rd, 4th, and 5th January the road from Bapaume to Albert was " crowded with wounded, who were being carried partly into the hospital at " Albert, partly through Albert to Amiens. At Albert there had been estab- " lished a small Etappen Lazareth (Voluntary Field Hospital) for the use of " the detachment operating the siege of Peronne. This hospital received " orders to evacuate all its patients to the rear, to Amiens, where meanwhile " two more German hospitals had been established. Thus, notwithstanding " the work of the evacuating trains, 2,000 wounded (the highest number of " patients attained here) were at one time accommodated in three field laza- " reths. At this period also the want of Medical Officers for assistance, and " of the means of wholesale evacuation, was specially felt. Professor Dr. Bush " had plenty of opportunities to act in his sphere of Consulting Surgeon-

" General of the Army of the North, in conducting operations and consulta-
" tions, while at the same time many Surgeons of other field hospitals received
" orders to join and assist at Amiens. Great relief was after some time ob-
" tained by a well-planned evacuation of the wounded by sanitary trains to
" Germany direct. The above-mentioned two sanitary trains of December
" were followed in January by four, in February by two, in March by one, so
" that in all nine trains, of about 500 wounded each, were sent from Amiens
" to Germany. Two of those trains came from Berlin, two from Bavaria, two
" from Cologne. Those sanitary trains, although generally practical in their
" arrangements, require still to be improved with regard to ventilation. With
" eight beds in a carriage, special arrangements for ventilation ought to be
" made to maintain proper circulation of air in a long journey.

*Temporary Wooden War Hospital at Metz.*—As an example of French temporary hospitals, the account given by M. Demoget may be quoted. During the siege of Metz both the French and Germans were obliged to put up a great number of temporary hospitals. M. Demoget, a French architect, has published a work* with a full description of those erected by the French and a notice of the German buildings. A good deal of the work is taken up with a history (often incomplete) of these temporary buildings, and an account of the American and German plans. The English arrangements which preceded and originated all others are singularly enough entirely omitted.

At the temporary hospital erected at the Polygon at Metz, by M. Demoget, it was necessary to use the utmost despatch; wood was bought in the market, and was not sawn into special lengths; all old doors, windows, persiennes, cupboards, glass, &c., which could be found at Metz, were also bought, and proved of the greatest use. All the bolts, locks, &c., were of the simplest kind; many of the bolts were of wood. In this way there was a great economy both of time and money. Carpenters, joiners, glaziers, locksmiths, were all employed at the same time. Detailed descriptions are given of the method of construction and of the cost. The total expense for an hospital of 1,500 beds was 163,000 francs, or 108 francs per bed, but the subsequent sale of the materials reduced the cost to nearly 50 francs, or 2*l.* per bed. We



Scale, ·01 per metre.

*Section of a Pavilion for Wounded Men at the Temporary Hospital at Metz.*

* " Etude sur la Construction des Ambulances Temporaires." Par A. Demoget. Paris. 1871.

believe, however, that this includes merely the cost of the hospital huts, not the cost of the administrative buildings (such as the kitchens, dispensary, laundry, &c.

At the Polygon at Metz each hospital hut or barrack was 52 metres (170 feet) in length; 7 metres in breadth (= 23½ feet), and 3 metres (10 feet nearly) in height from just above the floor to the spring of the rafters; the floor was elevated 1½ feet from the ground. The posts supporting the rafters were 4 metres (13 feet) in length, and were about 13 inches in the ground. The planks forming the walls were overlapping, like the scales of a fish; they commenced at the floor, but ended 15 inches below the roof, so as to make along the whole length of the sides one long window just under the eaves. The roof, formed of planks of the best deal, had a fall of one-third, On the ridge was a cupola running the whole length, as seen in the sketch.

This wooden roof was very imperfect; the rain came through the knots during the first days of rain, and the alternate drying and moistening of the wood caused frequent dropping of rain. The author, therefore, recommends bituminous pasteboard or zinc instead of wood.

At each end of the ward were two small rooms, intended—1st, for the Surgeon in charge or sister; 2nd for the linen; third, for two orderlies; 4th, for an utensil store. It was found desirable to have a door at each end of the narrow passage leading between the two rooms to the ward, or to have a curtain at the inner end, otherwise the opening of the doors causes great draught. The ventilation through the eave windows and through the ridge was extremely good; it would have been too much for winter, but from April to the 1st of October it answered well. The cubic space per bed was 24 cubic metres, or 840 cubic feet; the space between the opposite beds was 9 feet. Each hut contained 50 beds. In the space under the floor, the author proposes to put the waste iron scales from a blacksmith's forge, or coke impregnated with tar, but it does not appear that either was actually used at Metz.

"Owing to these arrangements," says M. Demoget, "we obtained barracks "in which cases of erysipelas, purulent absorption, hospital gangrene are "very rare. It is true that the cold, according to some, increases somewhat "the number of cases of tetanus; but this defect is far from balancing the "advantages we have stated; and we have been able to confirm this for our- "selves at the ambulance of the Polygon at Metz, which was entirely pre- "served from the perils which are caused by all hospital concentration. At "every moment, even when the population under treatment reached the greatest "figure—2,270 sick—the wards were quite free from that obnoxious, per- "sistent, and characteristic odour which is the indication of a danger as "certain for the sick as for those who attend them:" (p. 109).

M. Demoget refers to some of the Prussian temporary hospitals at Metz; in some cases the gable was left entirely open, or covered only by canvas; the roof was made of bitumanized paper, and had a ridge opening of 1½ feet covered by a second roof. The price per bed was from 75 francs to 80 francs, and the huts could have been made more cheaply if the walls had been less high and the roof flatter.

The mode of warming in the winter recommended by Demoget is a stove in the centre of the ward with an outer covering, between which and the stove fresh air is admitted by two tubes under the floor; the chimney ran straight up through the roof, being surrounded for the last 3 or 4 feet by a casing opening above and below, which acted as a foul-air discharge flue.

With regard to the remaining buildings of the hospital, the kitchen (for 2,000 sick) was 23 feet broad and 39 feet long, with three large boilers (cooking each 800 litres = 1,400 pints), and three smaller boilers disposed against one wall, and in the centre ovens and apparatus for more delicate cooking. The scullery adjoining was 13 by 23 feet.

A penthouse in front of the kitchen (13 by 23 feet) was found of very great service.

The coal and wood store was close to the kitchen, and was also 13 by 23 feet in size.

The room for cutting up and distributing the food was 20 by 33 feet.

Near the kitchen was a building (20 feet by 66) which contained the larder, bread store, vegetable store, and the oil and lighting store. Below was

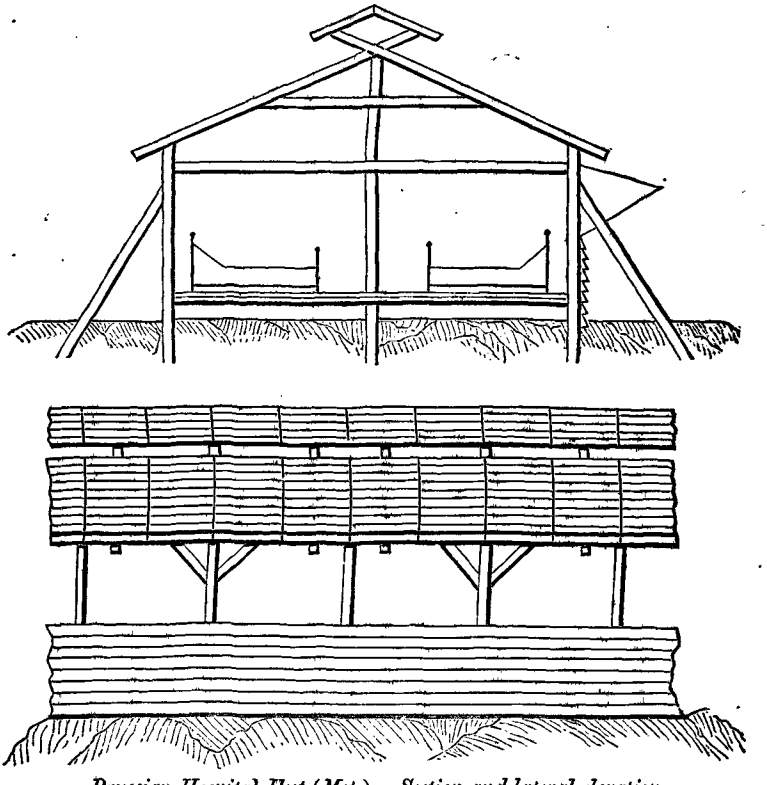
a cellar for the wine and oil, and 20 feet by 13 feet in size. It is proposed to arrange these buildings in future on three sides of a square, and to have a fence along the other side, so as to keep stragglers from the kitchen and adjacent stores. The total surface covered by the kitchen and its adjacent buildings would be about 65 square yards.

The dispensary, linen store, baths, utensil and furniture store, and the rooms for the Medical Officers need not be described.

The latrines at the Polygon at Metz were 16 feet from the end of the huts, and there were 4 seats below, the zinc basin of which was a large movable zinc barrel, which could be drawn up an inclined plane and removed every day or every second day. The floor of the closets was covered with cement, and the partitions were tarred. The system of brick receptacles placed in the ground was considered far inferior to the above plan. In the wards there were also movable close-stools.

It will be seen from the above description that the same principles which have been adopted in the English, American, and German armies, of cheap temporary, one-storied, wooden buildings for hospitals, have now been adopted in the French. We do not perceive that any great improvement has been introduced in this matter, but the cheapness (if proper arrangements are made) and the success of these temporary buildings is fully confirmed by the French experience at Metz.

The Prussian arrangement of the ridge was rather different, and was simpler, so that, probably for most war hospital huts, the plan shown in the sketch below of one of the Metz Prussian huts would be better than the French.



*Prussian Hospital Hut (Metz). Section and lateral elevation.*

*The Bavarian Field Hospitals.*—Dr. Rupprecht, at the end of his useful work on the surgery of the late war drawn from his experience with the Bavarians,* has a few remarks on the field hospitals and on marches. The Bavarian and Prussian plans are not the same, and the advantage is with the latter system. Rupprecht first points out that the several Bavarian reception field hospitals were not brought into proper co-operation. The Surgeons at one hospital were, it may be, overburdened with wounded, and yet did not know whether the other hospitals were, and how they could dispose of their patients. This was owing to the neglect of the department charged with the arrangement of the marches and transport (Etappen-Wesen). In the Bavarian hospitals the Principal Medical Officer was not in command as in the Prussian,† and this led to endless misunderstandings and difficulties. Rupprecht says that to alter the Bavarian system would be the most important and necessary change in the field hospitals.

One of the most necessary duties in connection with the field hospitals is its proper evacuation. Rupprecht speaks strongly about the necessity for this being carried on for three reasons; 1, to make room for the constantly-arriving sick and wounded; 2, to improve the hygienic condition of the field hospitals; 3, to keep these hospitals movable. The most careful arrangements must, therefore, be made first to remove, and then to receive and attend the sick on their road to and at their arrival in the rear. This duty was given over to the Etappen in the late war by both Prussians and Bavarians. The means of conveyance, however, were often inefficient, and the men in many of the wagons were unprotected from sun and rain.

With regard to marches he mentions that the best ointment for footsoreness was found to be 1 gramme of pure tannin in 90 grammes of unguent plumbi.

*Tent Hospitals.*—Numerous tent hospitals were established during the war not only as field, but at stationary and reserve hospitals. The hospital near Bingen, established by the German Association in London, and which was under the care of Mr. Simon and Dr. Thudichum, appears to have been a very perfect one‡; but tent hospitals were also established at many other places in Germany, and appear to have given satisfaction.

A very good account of tents, American, Prussian, and English, is given by Mr. Schatz§. He comes to the conclusion that the Prussian hospital tent is much too large (62 feet in length), and that even the smaller English marquee might be smaller with advantage. He very much approves the ventilation of the latter tent from the top. If many tents are placed together, he recommends the triangle or the half circle as the arrangement. In America, 30 feet were placed between each tent.

It may be interesting to give here the official statement made in the last "Statistical Health Report of the Prussian Army," lately published, although it refers to the year 1867. The Prussians have now employed tents every summer to relieve the hospitals, and to treat certain cases. The reporters thus sum up their judgment:—

"Upon the whole, the treatment under tents has in this year again shown "that the majority of patients can be more rapidly and surely cured through "the influence of an abundant volume of air. Experience has again proved "that febrile diseases, especially those manifesting a vast increase of tem-"perature, soon undergo a favourable change, but this wholesome influence "only continues to the convalescent stage, when the treatment in the solid "building becomes imperative.

"As the loss of temperature, which is felt by the convelescent chiefly at "night time, is likely to be followed by injurious effects on the curative pro-"cess, special attention has to be directed to watch the tent cases thermo-"metrically, in order not to allow a relapse of the disease, or its conversion "into another produced by cold. Extraordinary care has to be given in

* "Militär ärtzliche Erfahrungen." Von Dr. L. Rupprecht. Würzburg. 1871.

† In the instructions for military hospitals, issued at Berlin in 1869, the rule is thus laid down:—"The Chief Surgeon has command over the field hospital. The "military, medical, and administrative *personnel* must obey him unconditionally."

‡ A description is given in the "Times" of October 14, 1870, and in the "Lancet" of November 26, 1870.

§ "Ann. d'Hygiéne." October, 1870.

" watching the occurrence of considerable changes of temperature, because, " in that case, the danger of catching cold will amount to an increase of a " disease which was already subsiding.

" For the highly successful treatment of typhus cases under tents, and " with the application of cold baths, the proximity of a well is desirable.

" Dysentery cases are treated with advantage in a tent, if the patients are " made to retain their clothes in bed, in order that in moving from the bed, or " during the application of the bed-pan, they may not be exposed to catching " cold. The larger volume of air in the tent contributes to dispel the smell of " the stools, and renders the treatment of dysentery cases in the tent chiefly " recommendable.

" Tents have been found absolutely indispensable in larger hospitals during " summer time in cases where some of the rooms had to be evacuated in order " to have them thoroughly ventilated and disinfected, and also where a tem- " porary additional accommodation for the patients was required. This " important advantage which may be derived from tents as places of evacua- " tion cannot be too highly estimated.

" Occasional complaints had reference to the insufficient capacity of some " tents (after having been used already in 1866) to withstand rain.

" In other instances, the clapping of the sides of the tent, in case of a " strong wind, has appeared very disagreeable to the patients; but, to make " up for this, the quietude in a tent during a calm is much greater than that " obtainable in the hospital.

" Insects will creep up from the ground into the bed. They are to be kept " out by placing tarred pieces of wood under the bedposts.

" Another difficulty, not easy to overcome, is the great number of flies " which are attracted into the tent by the flavour of the eatables. Frequent " chasing and copious ventilation are the best preservatives against them. " Latterly, the disengagement of a small quantity of carbolic acid vapours has " been warmly recommended.

" At all events, the results obtained during the year 1867 from the treat- " ment of the sick under tents have confirmed the high value of tent treat- " ment for sick persons."

*The Hospital Barracks in the Jardin des Plantes.*—Michel Lévy, the celebrated Director of the Medical School at the Val de Grâce, has given a full account* of the wooden houses put up in the Luxembourg and in the Jardin des Plantes. As soon as the war was declared, Lévy represented to the authorities the necessity "of quitting the old routine traditions of the service, " and of initiating on a large scale the system of the United States, in " establishing temporary installations of wounded and sick, instead of the " occupation of convents, barracks, churches, and old buildings." The advice was followed, and Lévy gives drawings of the buildings and ground-plan at the Luxembourg; they are very similar to those described at Metz. So impressed did he become with their utility that at the end of his paper he expreses a hope that the "*méphitisme seculaire*" of the old hospitals may be for ever done away with by theuse of similar barrack hospitals which, after lasting 10 years, may be destroyed and replaced by others.

*Burials at Metz.*—The disposal of the numerous French dead at Metz was attended with some difficulty, as the place of burial was very limited, A pit of about 17 feet in depth was filled with dead, disposed of as follows:—A row of bodies was laid side by side; above this a second row was placed, with the heads laid against the feet of the 1st row; the 3rd row were placed across, and the 4th row in the same way, but with the heads to the feet of the former; the 5th row were placed as No. 1, and so on. Between each layer of bodies about an inch of lime, in powder, was placed. From 90 to 100 bodies were thus arranged on a length of 6½ feet, and reached to about 6 feet from the surface; the pit was then filled up with earth, and though 8,400 bodies were put in that pit there were no perceptible emanations at any time.†

Around Metz the graves of men and horses were disinfected with lime and sulphate of iron.

* "Ann. d'Hygiene," January 1871, p. 116.

† "Etude sur la Construction des Ambulances Temporaires." Par A. Demoget. Paris, 1871, p. 199.

## APPENDIX No. II.

## ON A CAPE-TENT.

By E. A Parkes, M.D., F.R.S., Professor of Hygiene in the Army Medical School.

During active service in most temperate climates, protection from rain, and from wet ground, are very important means of preserving the health of the soldier. At present there is no authorized pattern of a waterproof cape for service in war, and yet such a cape is a necessity. The present great-coat, which is well adapted for dry and very cold weather, is less usefu against wet; it absorbs much rain, becomes extremely heavy, and dries so slowly that it is still damp two or three days after heavy rain. In case of war it would be necessary at once to issue waterproof capes and sheets, and the pattern should, therefore, be well considered beforehand.

Although there have been many proposals in different armies, none appear to fulfil all the conditions which a cape should serve. There are—first, that the protection from wet should be complete; second, that the cape should serve as a waterproof sheet and cover at the same time when the man lies on wet ground; and third, that it should be capable of being made on emergency into a shelter-tent.

This last point is an important one. In the rapid movements of modern war, an army must often either leave its baggage, including tents, behind, and the men must either then be entirely without tents, or be provided with some kind of shelter-tent. In outpost, and other detached duties also, the men are necessarily unprovided with tents, and some kind of protection in bad weather is an incalculable boon. A shelter-tent which was formerly in use in our army, and one which is used by the French, provides for this last state of things, but it has the great disadvantage that the ropes and sticks have to be carried, and it also makes a cumbrous and inefficient cape.

In a cape-tent which I have constructed, I believe all the points referred to have been carried out, and, at any rate, it seems desirable that it should be fully tested.

This cape-tent consists of a quadrangular piece of waterproof cloth or canvas, which is 7 feet 4 inches long, and 2 feet 2 inches broad; on one of the long sides is a row of tapes or buttons, and on the other side are two triangular pieces, slightly rounded, and each measuring 3 feet 8 inches at the base, and having a height of 3 feet; along the inner edge of each is a row of buttons.

When used as a cape the triangles fall in front, and are buttoned; the quadrangular piece covers the shoulders, and the two ends being brought together behind and buttoned, a cape is formed which completely shelters a man of usual height from the neck to the middle of the leg, where the legging comes up. The cape is loose enough to cover the valise equipment, and to allow the rifle to be carried under it.

When put on the ground the man lies on one half, and draws the other half over him; he is thus completely protected from the shoulders to the middle of the leg, both from the wet ground and from rain.

In order to make the cape into a tent, an arrangement of thin cords with small oaken pegs attached, has been contrived; both cords and pegs are concealed by sheaths, and the addition they make to the weight is trifling.

When it is wished to pitch the tent, the rifle is used instead of the tent-pole; a samll bag is slipped over the rifle, the pegs are taken out of the sheaths,

and driven into the ground with the heel of the boot, and in a moment a half-tent is erected which, when joined to another half-tent, forms a good shelter for two men. The tent is thus composed of a quadrangle, 4 feet to a side, and of two triangles each 4 feet across, and 2 feet from base to apex. The total length is, therefore, 8 feet, but only about 7 feet are available. The men lie head to foot, the head in the triangle, the shoulders just below the rifles in the quadrangle. There is plenty of room, and the tent stands very firmly.

The rifles are disengaged without the least difficulty; the man simply pulls up a side peg, and slips out, drawing as he does so his rifle with him; from experiments it is found that it takes about 6 to 8 seconds for a man to get out of the tent with his rifle ready for service.

The shelter given by this tent is as good as can ever be the case in any shelter-tent, and the space per man is larger than in a bell-tent with 15 men.

It may be questioned whether the rifles should be thus used, but on enquiring from an officer of experience whether it could be permitted, I learn that it is not likely any objection will be made. There is no strain on the rifles, they are disengaged with great rapidity, and they are quite protected from the weather; so that it seems rather a good arrangement for the rifles than otherwise.

Instead of pitching the tent for two men, one sheet can be made into a half-tent, and the other laid on the ground; two men can then lie, and be protected to the middle of the thigh, and indeed, by a little management of the sheet on the ground, can be covered to below the knee. The great advantage of this during a wet or windy night will be appreciated by everyone.

I was desirous of having this cape-tent tried in the autumn manœuvres, and Dr. Madden and Dr. Lane, of the 1st Battalion of the 4th Regiment, were good enough to give it a trial. The 4th Regiment contains several officers who have paid great attention to the subject of clothing and accoutrements; and I was, therefore, particularly anxious it should be tested in that regiment. As Dr. Madden was detailed for duty elsewhere, the cape was tried by Dr. Lane, whose report I subjoin. The points noticed by him have been remedied, and the plan seems now complete and ready for an extended trial. The only point which has to be more fully tested is the question of material. A paraffined canvas was used in the capes reported on by Dr. Lane; it is strong, light, and a good waterproof, but unfortunately it had been badly dried, and was sticky. The weight, including ropes and pegs, was only 3 lbs. for each cape.

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## REPORT ON TRIAL OF CAPE-TENT.

By Assistant-Surgeon LANE, 1st Battalion 4th Regiment.

Two of these articles of equipment having been submitted to me for report, I have to give the following as the sum of my observations:—

Firstly, as to their design.

Secondly, as to their material.

Their design is to provide the soldier with a waterproof cape that can be used when required as a waterproof sheet. In addition, by an ingenious adaption of whip-cord, pegs, and hooks-and-eyes, two can be conjoined, and made to serve as a shelter-tent sufficient to protect two soldiers from rain and wind.

I have to regret that during the 10 days' manœuvres there was no weather sufficiently severe to test the cape crucially in some of the particulars adverted to, but so far as it was tried it proved a success.

1st. As a waterproof cape its design was approved of by all who had an opportunity of judging it. I exhibited it to many officers, old sportsmen and

campaigners, who all said it was the most perfect thing of the kind they had ever examined.

The accessories by which it can be employed as a tent by no means inconvenience its use as a cape.

2nd. As a waterproof sheet, in shape and size, it is quite as good as that ordinarily issued to troops in the field, while its capacity for employment as a cape in wet weather makes it immensely superior.

3rd. By conjoining two a small tente d'abris can be made. I regard this as an extra purpose in the design of the cape. It is capable of holding its own as a cape and waterproof sheet combined against anything. However, I have given it trial as a tent, and found it admirable. I consider that it would give ample shelter to two men on a bivouac. Even in heavy rain, with a slight trench made round it, it is capable of affording its inmates perfect protection. The sole objection I have heard urged against it is that in case of a surprise there might be a difficulty met with in disengaging the rifles used as its supports.

I answer these objections thus: at the outposts, reserves only might be permitted to erect these tents. Even if it were considered unsafe to extend permission so far, the troops of the main body, if marching without tents, would derive benefit from their employment: and even if the enemy advanced they would have time after the alarm deliberately to strike the little tents and disengage their arms.

Next, in a country where there are hedges or trees, stakes or branches might be substituted for the rifles.

Two capes could be employed, one as a half-tent, and the other as a waterproof sheet, to supply shelter to two men on a cold windy night, by turning the back of the half-tent to windward, and attaching an additional piece of cord to the stake or rifle, as a fourth guy or stay. Less shelter than this is found on such occassions efficacious and acceptable.

The best method of carrying the waterproof cape on the march, is rolled and worn over the left shoulder *en bandolier*.

*Materials and Workmanship.*

Some observers have advocated a stronger material, more approaching canvas in substance, as the fabric best suited to its manufacture; but I advocate nothing calculated to increase the present weight of the cape, which is under 3 lbs.

The bags made to fit over the ends of the rifles might be advantageously made of stronger material than the rest. I think a thinner and lighter whip-cord might be employed for the guy ropes, and I should recommend that buttons and button-holes be dispensed with. The button-holes stretch and cease to catch. They also fray at the edges. Buttons are easily torn off. Hooks-and-eyes are the best fastenings. In the trial capes there occurred, after some service, a shrinking and warping of material. This was observed at the points where the whip-cord emerged from the seams. Precaution in the manufacture would obviate this. Lastly, whatever be the substance used to render the cloth waterproof, it should not stick the surfaces together when the cape is rolled up.

## APPENDIX No. III.

## THE FIELD MEDICAL SERVICE OF THE PRUSSIAN ARMY.

By Surgeon-Major THOMAS G. FITZGERALD, F.R.C.S., late Commissioner to the Head-Quarters of the German Army; and to the Military Hospitals at Strasburg, Metz, and in Rhineland.

IN the Prussian Army the medical service is organized on the principle of separating the disabled, while under medical treatment, from the effectives of the forces.

In the field, when a soldier becomes ill, or is disabled by wounds, he ceases—until cured and fit to return to duty—to have any connection with the regiment to which he belongs. This system works extremely well, enabling the invalid soldier to have the best available care and attention, and relieving the fighting forces from encumbrance. A well-devised and elaborate medical system has been framed to carry this principle into practice, due regard being had to maintaining the forces in the front at their maximum strength. Instead of sick and wounded being hurried on with their regiments, and thereby encumbering the forces, they are removed for treatment to regularly organized field hospitals, which are separated from the active troops, but being extremely movable and provided with their own transport, rapidly follow the advancing army corps or division. Although the sick and wounded are removed from their regiments, they are not sent indiscriminately to the rear of the army to be treated in any general hospital that may happen to be established, as appears to have occurred with the English in the early part of the Peninsular War; but they are admitted and treated in—so to speak, intercepted by—properly organized field hospitals established in the immediate vicinity of the army.

Ambulance Columns and Field Hospitals.

The ambulance carriages intended for the conveyance of the disabled are arranged, in definite units, with a fixed proportion of store wagons and surgical equipment, forming sanitary detachments or columns. The hospital stores, equipments, and materials for the treatment of patients are packed and arranged in regulation quantities, and according to a fixed pattern, constituting a "field hospital."

The Medical Officers and subordinates, as well as the wagons and stores allotted to these "sanitary detachments and field hospitals" are permanently attached, move together, and are employed with the particular establishment to which they belong. When an ambulance detachment or a field hospital is ordered by the General to move in a particular direction, it is not delayed by the Principal Medical Officer having to make the necessary arrangements, by collecting stores from one place and officials from other localities.

To replenish and keep these establishments effective, medical and hospital field reserves are regularly organized, are allotted and move according to regulation.

These various medical field formations have a recognized position in the military arrangements; and each has a complete cadre of surgeons, officials, men, wagons, stores, &c., according to regulation, the "train" furnishing horses, drivers, grooms, &c.

To readily understand the details of this system, the arrangements of the field medical service may be treated under the following headings:—

A. Arrangements intended for the immediate relief of the wounded and sick.
B. Consulting-surgeons.
C. Field medical administration and field hospital direction.
D. Field medical and hospital store reserves.
E. Etappen-hospitals, stationary war-hospitals, and reserve-hospitals.

*A. For Immediate Attendance on Sick and Wounded.*

1. Medical Officers attached to regiments, cantonment hospitals, field surgery in minor actions.
2. Sanitary or ambulance detachments, including the collection, dressing, attendance, and removal of wounded from the battle-field.
3. Field hospitals for the reception and temporary treatment of patients.

1. Medical Officers attached to regiments :—

To each regiment of Infantry, composed of three battalions, there are attached 1 chief staff-surgeon, 2 staff-surgeons, and 3 assistant surgeons, 1 staff-surgeon, and an assistant-surgeon being attached to each battalion.

A Cavalry regiment has a staff-surgeon, and one or two assistant surgeons.

A division of Artillery has 1 surgeon and an assistant-surgeon for each battery.

Regimental Equipment.

Each battalion of Infantry and each regiment of Cavalry is provided with a two-wheeled medicine cart, containing medical and surgical necessaries, and carrying a few portable stretchers; but there is no regimental hospital equipment, nor is any provision made for opening either regimental or detachment hospitals. In some instances, when a regiment is stationary for some time, a few slight cases may be treated for a day or so in quarters; but in such cases this is arranged by companies, and not by regiments or battalions. In cantonments special arrangements are made as follows :—

In Cantonments; Sick Depôts.

In cantonments, for the treatment of the slightly sick of the troops, "sick depôts" are formed, and placed under special medical and military control. On the removal of the troops, the patients remaining in these depôts who are unfit to march are sent to the nearest hospital; and such as are unable to be transported are, under the instructions of the nearest etappen command, handed over to the parish or local authority.

Cantonment Hospitals.

For the reception of the rest of the patients, first of all the garrison hospitals at home are employed, even if these require to be extended, and then the civil infirmaries. The providing for the extension of the garrison hospital, or for the union with civil establishments, rests with the district intendency, on the requisition of the field intendency. If no hospitals, or not in sufficient proportion, exist, special "cantonment hospitals" are formed.

The General Commanding orders, on the representation of the field intendent and corps Surgeon-General, what cantonment hospital, or for what troops, are to be established. The carrying out of these orders is the business of the field intendency, in concurrence with the Surgeon-General.

The arrangement of these hospitals is determined chiefly by the probable duration of the cantonment, and is generally based on the calculation of a sick-list of 3 per cent. of the strength of the troops stationed there.

Staff and materials for the same are borrowed from the field hospitals, and Staff also, so far as circumstances permit, may be obtained from the ambulance detachments and from the field medical reserve. For the rest, these hospitals are organized in a manner analogous to field-hospitals.

On the departure of the army, these hospitals are closed by the evacuation, as much as possible of the remaining patients into the nearest "stationary hospital;" or by the transfer of the sick who are unfit to be transported, to the local authorities for further medical treatment and care. But if the closing of the cantonment hospital be not practicable, it comes under the control of the district military authorities at home, and under the general etappen inspection abroad.

Regimental Medical Officers.

Medical officers attached to regiments accompany the troops, attending casualties on the line of march, seeing the sick in the morning, treating trivial cases of sickness or injury in quarters or in bivouac, performing the whole of the surgery in minor actions, and affording the first assistance on the field in serious battles.

On the Line of March; Etappen Hospitals.

On the march, the men temporarily sick, the footsore and such invalids as will probably be again fit in a day or so for the march or for camp, get along in any carts or wagons that may be at hand; or if they are unable to do this, on the arrival of the force at nearest halting place, conveyance is sent back for them. The more serious cases are sent to the etappen hospital, or to the nearest town or railway station in possession of the army. Etappen hospitals

are opened at regular intervals, of 15 to 20 miles distant, along the etappen-lines; and at the principal etappen stations larger etappen hospitals are formed. Carts or wagons, littered with straw, are used for the carriage of these men, the ambulance-carriages not being employed in conveying sick on the line of march. Usually, patients that are unable to bear transporting are handed over to the local authorities for medical treatment and proper care.

Minor Actions with the Enemy.

In slight engagements the regimental medical officers advance with their regiments under fire, and afford such surgical aid as they are able to those who fall. On service each soldier carries a field-dressing, consisting of a bandage, some charpie, and a piece of linen. If the man be wounded, this is immediately available as a simple dressing; and should any other surgical material or minor appliance be needed, it can be obtained from the pocket of the stretcher or from the medicine knapsack.

Nothverband-Platz. Urgent Bandage-places.

"Urgent" or "casual" bandage places are formed, beyond rifle range, under the orders of the Officer Commanding. The surgeons and assistant-surgeons of the troops in support and reserve are distributed according to the number and situation of these bandage places. The medicine carts are advanced as far as possible, and the stretchers belonging to the same are used in carrying the badly wounded off the field. The wounded in slight engagements are brought to the "urgent bandage-place" by the assistant sick bearers belonging to the troops, four to each company. These assistant sick-bearers are in advance, with the troops in the front. They manage the transport under the military superintendence of a non-commissioned officer, according to the directions of the regimental surgeons and hospital helpers. These assistant-bearers are not allowed to congregate at the bandage places; but as soon as the removal of a wounded man is completed, they return forthwith to their troops and proceed to the front. In some exceptional instances the assistant-bearers of troops not actually engaged in battle may be assembled together by the orders of the officer commanding the troops.

Regimental Surgeons at the Bandage-places.

The Regimental Medical Officer of the highest grade or of the longest service conducts these bandage-places. The duty of the regimental surgeon consists in examining the injuries, applying simple dressings and bandages, in performing necessary surgical operations. In addition to the above, measures must be taken to remove the wounded, when dressed, to the best available shelter in the vicinity of the bandage-place, where proper care is bestowed upon them, until they can be transported to hospital—either to a field-hospital or to an etappen station.

The ambulance carriages are not employed in minor engagements, and the field hospitals are not brought up, unless on the special requisition of the General Commanding.

### 2. *Sanitary Columns or Detachments.*

Number of Ambulance Columns to an Army Corps.

There are three sanitary columns or detachments to an army corps, and each column is divided into two equal and similar sections. One sanitary column is permanently attached to each Infantry Division; the third, accompanying the reserve, or Corps-Artillery, is available for general work at the disposition of the General Commanding the army corps. These sanitary columns are formed where the train depôt is mobilized, and are attached to the train of the army corps on active service.

Movement.

On the forward movement of the army after a battle, the sanitary detachment, or at least one section, quickly follows its division. If this be impossible, in consequence of the entire detachment being unavoidably detained, the General Commanding directs the third sanitary column, or one section thereof, to be attached to the division. On a retrograde movement, the directing surgeon arranges who of the medical officers and subordinates, as well as what stores shall be left behind, the Commanding Officer taking the whole of the remaining staff and materials in safety after the army.

A sanitary column or detachment comprises the following transport and Staff:—

Composition of an Ambulance Column.

6 Two-horse ambulance carriages for the conveyance of severely wounded.
42 Bearers or stretchers for the carriage, by hand, of injured men from point to point, to or from the ambulance-carriages to the bandage places, or to the field hospitals.

3 Wheeled-supports for stretchers.
2 Two-horse wagons, specially constructed for dispensary purposes, and equipped with instruments, surgical dressings, materials, splints, chloroform, medicines, and medical comforts.*
2 Two-horse wagons for stores and baggage.
2 Staff-surgeons, first and second, mounted.
5 Assistant-surgeons, mounted.
1 Field apothecary or dispenser, mounted.
2 Chief or upper hospital helpers.
6 Hospital helpers.
8 Military sick attendants.
1 Second-class Cavalry Captain, mounted.
2 Lieutenants, first and second, mounted.
1 Paymaster or treasurer, mounted.
1 Chief or head non-commissioned officer.
4 Serjeants.
8 Corporals.
12 Lance corporals:—bearers.
120 Privates, as bearers.
4 Buglers.
3 Mounted train non-commissioned officers.
3 Train corporals, mounted.
23 Train soldiers, 11 drivers, and 12 grooms.
41 Horses:—19 saddle and 22 harness.

A number of wagons or country carts, well littered with straw, are added, when the ambulance detachment is likely to be brought into activity; and at other times country carts, carrying forage, provisions, &c., accompany the detachment.

Order of March.

On the line of march the following order is observed:—A small party of bearers in front; then the Captain, the Medical Officers, the Lieutenants, and the Paymaster, all mounted. The company of sick bearers march next, and are immediately followed by the ambulance carriages for the conveyance of wounded. The sanitary or medicine wagons and the store or baggage wagons then follow, and the rear is brought up by the country wagons or peasants' carts with forage, provisions, &c., and by the remount horses for the surgeons and assistant-surgeons.

Division into Sections.

When an ambulance detachment is divided into two parts, acting separately, the command of the second section falls to the first Lieutenant. The staff under such circumstances is divided thus:—the Captain, the second Lieutenant, one staff-surgeon, two assistant-surgeons, and the apothecary accompany the first section; the first Lieutenant, one staff-surgeon, and three assistant-surgeons accompany the second section. In the latter, the third assistant-surgeon is expected to undertake the duty of the apothecary, and the chief non-commissioned officer acts as paymaster to the section, the money-chest and the regular paymaster being with the first section.

Not used in Minor Actions or on the March.

These ambulance detachments are not intended to afford hospital accommodation or ward shelter for patients; but they establish dressing or operating stations, collect and remove the wounded from the battle field. In minor engagements they are not employed, the wounded in such small encounters, as already mentioned, being attended by the regimental surgeons, assisted in rear by the Medical Officers of troops not actually engaged. The ambulance carriages are not used for the conveyance of sick on the line of march, or of sick in camp; nor are they intended to meet the necessities of distant removals of wounded. They are not intended for use in the evacuation of sick or wounded.

In general actions or important battles, the ambulance detachments come into activity. That attached to each Infantry division accompanies the troops directly into action on the battle-field. The orders for its movement and

* The following Medical comforts are provided, by Regulation, to each ambulance detachment, the quantities being equally divided between the two sanitary wagons:—English biscuits, 10 lbs.; brandy, 6 bottles; chocolate in small tablets to be eaten, 6 lbs.; Liebig's extract of meat, in 1 lb. pots, 6 lbs.; roasted coffee, 10 lbs; white and red wine, 9 dozen; vinegar, 8 bottles; lemon-juice, 1 lb.; sugar, 6 lbs.

application being received direct from the Division Commander, who also arranges, according to circumstances, whether the whole or one section shall come into play, or whether the two sections shall act independently on account of the extension of the line of battle. These sections may be ordered to establish separate "troop bandage-places," or they may have to join in the formation of the "Head bandage-place." Ambulance Columns in General Actions.

In default of such orders, and when there is risk in delay, these arrangements are to be made by the division surgeon. If from unexpected change in military operations, or other unforeseen circumstances, such instructions become inapplicable, the officer commanding the ambulance detachment gives the required orders and makes the necessary dispositions.

The Division General fixes the locality in which the bandage-place shall be established. This is to be not far behind the line of battle:—according to Regulation, half-way or wholly out of rifle range, so that the wounded can quickly arrive thither. On the advance of the troops during the fighting, the bandage-place must be pushed forward. Head Bandage place.

In arranging the bandage-places, appropriate buildings are to be utilized, if such exist, under shelter in the vicinity of the battle; otherwise an operating tent is to be pitched in a suitable situation under cover from fire. By day the bandage-place is distinguished by a national ensign and by the red-cross flag of Geneva-Convention; by night a red lantern indicates its position.

The ambulance carriages are pushed forward as far as possible, and in some instances they have approached extremely close to the actual combatants, occasionally getting under small-arm fire. The surgeons attached to the ambulance detachments, with a proportion of the Regimental Medical Officers, attend at the bandage-places formed in accordance with previous instructions, or according to circumstances as they arise. The two wagons containing instruments, surgical dressings, and chloroform, are brought up to these bandage-places to furnish the necessary stores. Straggling wounded and such injured men as can be helped or carried away during the action receive the attention their cases may need, and they are rapidly moved further back to the field hospitals. But as soon as the action draws to a close, the real business of collecting, attending to, and removing the fallen commences. This is done, under the orders of the Commanding Officer, by the company of trained bearers belonging to the ambulance detachments. Four men are allotted by Regulation to each stretcher—two to carry the wounded man on the stretcher, and two as reliefs and to pick up arms, kit, &c. The company of bearers belonging to the ambulance detachment is divided into two wings, each under the immediate orders of an officer. Each wing is subdivided into squads of 12 men, with three stretchers, under the orders of a non-commissioned officer. These squads of bearers regularly patrol the battle-field and its vicinity. They examine carefully the whole of the fallen, separating the still living from the dead, giving help to the former and removing them to the nearest bandage-place, to the ambulance carriages, or perhaps to the field hospitals if these happen to occupy advanced positions. This separating the living from the dead requires great care and attention, as not unfrequently a man who is not mortally injured may, from loss of blood, collapse, previous over-fatigue, or other temporary cause, be in a state of lethargy almost resembling death. So that every dead man requires to be examined to ascertain if the injury he has received appears to be mortal: if not, his heart should be examined to determine if life be extinct. Collecting the Wounded. Bearers in squads search the Battle-field.

These patrols of bearers also collect and take charge of stray arms, accoutrements, and other articles of value. When they have collected and removed all the wounded who can be found in the open, they systematically search the woods, neighbouring ditches, and adjacent parts in which straggling parties may have been engaged, or to which wounded men may have crawled for protection, quiet, and shelter. The bearers shout out at intervals, listening attentively for a response; they are also accompanied by buglers, the bugle calls permitting the searchers to scatter themselves more widely without fear of losing each other, or becoming separated from their party. Bearers patrol the woods and ditches.

The severely wounded are placed on stretchers, which may be carried by the bearers, or travel on the wheel-supports. These wheel-stretchers are on many occasions found to be extremely useful, and to afford many special

advantages. In some instances, in crossing fields traversed by ditches or deep ruts, they require to be raised and lifted across; but this is found to be as easily effected as with the ordinary strether, and harm is much less likely to occur to the injured man from the bearers stumbling, as is liable to happen with the ordinary stretcher when the bearers suddenly come upon a ditch. Moreover, considerably fewer bearers can convey a larger number of wounded over longer distances by these wheeled-stretchers than by those in common use.

In the British Army Medical Service these wheeled-stretchers will prove of immense utility, in conveying disabled men to and from hospital depôts and the ports of embarkation. If such appliances had been in existence during the Crimean war, they would have been invaluable at the enormous hospital establishments on the Bosphorus. Their use would have saved much suffering to the injured, and rendered the employment of ill-disposed and indifferently trained Greeks and Turks less necessary.

Arrangement of Medical Duties at the Head-Bandage-Places.

At the "head bandage-place" the directing-surgeon makes a judicious distribution of the duties and of the members of the Staff. In general, the Medical Officers are separated into three divisions, each of which is distinct in situation, succeeding each other in duties and in professional function.

1st Division.

The first division specially attends to the mortally wounded and to the slightly injured. All who arrive at this station have their garments cut off, the blood and dust removed, and are submitted to a regular examination, provided this has not been previously done on the field, as shown by a "diagnosis-tablet" attached to the injured man. The slightly wounded—superficial and flesh injuries—after the necessary surgical manipulations, and having been dressed, are sent further on, according to instructions. The mortally injured, to whom further removal would only augment the pains of dying, are placed aside in a sheltered spot, and such relief as their cases permit is afforded. It is very necessary, however, to carefully re-examine these cases subsequently, as it is sometimes found that most seriously wounded men ultimately recover, although at the time they are first brought in from the battle-field they appear to be dying, and no hope is at the time entertained of saving them.

2nd Division.

The second division has to apply difficult and complicated bandages, surgical appliances requiring time for their proper adjustment, plaster of Paris, or dextrine apparatus, &c. Cases of injury requiring the above, and instances of grave bone-injury, where an immediate amputation does not appear to be indicated, are treated here. Fractures of the lower extremity, especially of the thigh, belong to this category.

3rd Division.

The third division undertakes those capital operations, which must absolutely be peformed without delay, even at the bandage-place. To this category belong ligature of the main arteries on account of bleeding; tracheotomy for injuries of the larynx and windpipe; and, above all, amputation of the larger limbs on account of complete destruction or tearing off by heavy shot or shell. Resections do not belong to this category.

Diagnosis-Tablet.

After the first careful examination of the injury, and on the termination of the necessary surgical manipulation, the Medical Officer is obliged to fasten to the man's clothes a "diagnosis-tablet." On this tablet he specifies:—

Particulars to be specified.

1. In *Roman characters*, the grade or degree of the man's fitness to be transported.

I. If, from the nature of the injury, further removal would have the effect of endangering life: in this case the wounded man must, under all circumstances, be brought under shelter at the first station.

II. If, from the kind of wound, further transport is specially prejudicial: in this case such wounded are to be retained in the nearest asylum, provided there be acommodation.

III. If, from the character of the hurt, further transport or prolonged delay in receiving regular hospital treatment is less prejudicial: in this case the injured man is not admitted into hospital until it is convenient to do so.

Further, it is stated briefly and clearly—(2) The description of the injury; (3) The "transit" attention and care. These labels, if properly filled up, are of great utility in preventing frequent and repeated examinations and dressings of an injured man by successive Surgeons, into whose hands he may pass, and

facilitates the regular distribution of the wounded in directions and to distances suitable to their injuries.

Disposition of the Wounded. Transport of the Slightly Wounded.

The Division Surgeon settles the further disposition of the wounded from the bandage-place. The slightly wounded who, according to the Medical Reports, need no particular treatment, or whose state permits of their proceeding to a distant hospital, and whom, on that account, it is not proposed to admit into a field hospital, are transferred to the nearest etappen command. The necessary transport is engaged by the attendant Commander, on the part of the General commanding the division. These wounded then come under the general etappen inspection, are examined by the Field-hospital Director, and either treated until cured in convalescent annexes of the etappen hospitals; or if their speedy return to duty cannot ensue, they are removed to the reserve hospitals at the base of operations.

Removal to the Hospitals.

The rest of the wounded are, in accordance with the instructions and under the control of the Division Surgeon, distributed to the several established field hospitals, whereby the overcrowding of a particular hospital is avoided. The severely injured are brought into the nearest field hospital; those unable to walk are forwarded by means of the ambulance convoy, and these transports are followed by the wounded who are able to walk. The convoys of wounded should be accompanied by the Medical Officers, who have been lent, to the bandage-place, by the field-hospitals to which the wounded are now told off.

### 3. *Field Hospitals.*

Number of Field Hospitals to an Army Corps.

Each army corps has twelve field hospitals—four for each Infantry division, and four available for general duty with either or both divisions, or for detached purposes. The field hospitals follow the advancing army corps as closely as circumstances permit, their movements and position being regulated by the instructions of the Principal Medical Officer, under orders from the General commanding. The details of movement are arranged by the Field-hospital Director, each field hospital being under the sole management and authority of the Medical Officer in charge, so far as internal organization is concerned.

A field hospital is calculated for the accommodation of 200 patients, as a minimum; but it is considered to be capable of extension to a much larger number. The field hospitals are not attached to the "train," but belong to the "administration" of the army corps.

Composition of a Field Hospital.

Each field hospital comprises—

2 Sanitary-wagons, specially constructed for and equipped with medicines, surgical dressings, splints, chloroform, and Apothecaries' appliances.
4 Utensil-wagons equipped with Purveyor's stores, ward and kitchen utensils, and hospital necessaries of various kinds.
1 Wagon for baggage.
1 Head or Chief Staff-Surgeon, with two horses.
1 Staff-Surgeon, mounted.
3 Assistant-Surgeons, mounted.
3 Head or Chief Hospital-helpers.
6 Hospital-helpers.
1 Apothecary, mounted.
1 Apothecary's labourer.
1 Hospital Official-Inspector, mounted.
1 Accountant, mounted.
1 Cook.
12 Ward Orderlies, or Sick Attendants.
3 Non-Commissioned Officers:—1 Police-Serjeant, 1 Writer, and 1 Captain of Arms.
1 Train Guard Master, mounted.
1 Train Non-Commissioned Officer of the first class, mounted.
3 Train Corporals, mounted, including a Trumpeter.
17 Train Soldiers, 10 Drivers, and 7 Bâtmen.
34 Horses, 14 saddle, 12 harness, and 8 leaders.

The two sanitary wagons and the utensil wagons are exact counterparts of each other, both as regards contents and mode of packing. Thus a field hospital can be divided into two portions, each complete in requisites for patients, and provided with Regulation wagons to move separately. When

thus divided, the head Staff-Surgeon, one Assistant-Surgeon, the Apothecary, the hospital official, one head hospital-helper, three hospital-helpers, and six ward orderlies are attached to the first division; and the Staff-Surgeon, two Assistant-Surgeons, the dispenser, two head hospital helpers, three hospital helpers, and six ward orderlies proceed with the second division.

Movable Dispensaries or Medicine Wagons.

The wagons for medicines and surgical dressings are specially constructed, so as to render every article immediately accessible, and to adapt the movable fittings to furnish a stationary dispensary. The bottles and jars are placed on shelves arranged in separate compartments. These compartments of shelves move on broad rollers, and are run in perpendicularly, side by side, over the tail-board. The rest of the wagon is separated into compartments, each intended to hold special stores and medical supplies, as well as surgical instruments, splints, and appliances. Exact instructions for packing these wagons are furnished in the Regulations, the various compartments being lettered and numbered, similar to the plan in use in the medicine panniers of the British service.

Order of Marching.

On the line of march the following order is observed:—The hospital-helpers, the sick attendants and officers' servants in front; the non-commissioned officers; and then come the five Medical Officers, the Hospital Inspector, the Apothecary and the Accountant, all mounted. The two medicine and bandage wagons, and the four utensil and store wagons follow; and lastly, the baggage wagon and country carts, with forage, provisions, &c.

Field Hospitals Established.

The field hospitals are intended for the reception and ward treatment of sick and wounded sent from the front. They are opened in towns, villages, or detached buildings in the vicinity of the operating force, the most suitable and best conditioned buildings in the most sanitary situations being selected. The number of field hospitals ordered to be unpacked and established varies in proportion to the requirements of the sick and wounded, as few as possible being brought into activity at one time, and the rest being kept packed and ready for a sudden move. This depends upon the Principal Medical Officer.

When a general action is expected, the field hospitals are thrown forward; farm-houses, outbuildings, and villages are selected as near as possible to the "bandage-places" of the ambulance detachments. These buildings are rendered as comfortable as circumstances permit, and everything is made ready for the reception of patients. For some days the wounded are treated in these hospitals; but as soon as possible all cases that can bear removal are sent to the reserve hospitals at the base; only such men as would suffer further injury by removal—as gunshot fractures of the femur, serious wounds of the head or chest, &c., being retained for treatment on the spot. If the army corps be advancing or preparing to advance, every effort is made to relieve the field hospitals of such cases as cannot undergo transporting. "Stationary war-hospitals" are established, or, in some instances, the patients may be transferred to other hospitals, or handed over to the charge of various persons. In some instances, however, circumstances do not admit of a field hospital being evacuated for a considerable time. It then ceases either wholly or in part to be connected with its army corps, and is temporarily associated with the etappen service. As soon, however, as the hospital can be evacuated of sick and rendered free to move, it proceeds to rejoin the army corps to which it belongs. The supplies of food and stores are made to the field hospitals on the requisition of the Medical Officers in charge; but the Intendantur of the army corps or of the etappen department is responsible that the necessary supplies are forthcoming when required, the Medical Officer being responsible for making demands, receiving, issuing, and accounting for all articles requisite for carrying on the duties of the hospital under his charge.

In some instances become "stationary War Hospitals."

For the establishment of the field hospital, situations are designated as near as possible to the operating forces in a locality in which suitable buildings can be obtained. The Chief Surgeon is responsible for the selection of buildings that are unobjectionable in respect of the necessary sanitary requirements, of situation, construction, and arrangement. The following detail of accommodation for a field hospital for 200 patients is prescribed by Regulation:—

1. Wards for sick, affording 1,200 cubic feet to each patient.
2. A receiving-room.
3. An office and consulting-room.

4. An operating theatre, with an antechamber for the preservation of surgical instruments, bandages, and appliances.
5. Apothecary's store; when practicable to consist of two rooms, a kitchen, and a cellar.
6. A large cook-house, including a pantry on the ground-floor, so as to afford space for the preservation of bread, dry vegetables, &c.
7. Cellarage for the preservation of meat, drinks, green vegetables, &c.
8. On each story, a small kitchen, or at least a fireplace, to make tea, plasters, and fomentations.
9. Laundry, with mangle-house.
10. Room for soiled linen.
11. Two rooms and a kitchen on the ground-floor as a bath-place.
12. A dead-house, capable of being heated.
13. Space for disinfecting garments.
14. Store for clean bed and body linen.
15. Space to store the arms, uniforms, and private property of the sick and wounded, and the effects of the deceased.
16. Space to store the oils, candles, lamps, lanterns, and candlesticks.
17. Space to store the fuel.
18. Lofts for drying the linen, with partitions to store the utensils.
19. Proper ward-closets and urinals for the use of the patients, as well as others for the officials in the hospitals.
20. Space for washing.
21. Quarters for the orderly medical officer and hospital-helper on guard; also, when possible, for the domestic officials to reside on the premises.

### B. *Consulting Surgeons.*

Appointment and duties.

In case of war, and for the duration of mobilization, Consulting-Surgeons, with the rank and emoluments of a Surgeon-General, are added to the army. Distinguished Professors of Surgery and eminent surgeons from civil hospitals are selected, the nominations being made by His Majesty the Emperor on the recommendation of the head of the Army Medical Department in Berlin. These appointments are considered to be desirable on account of the serious hurts, the numbers falling sick, and the weighty sanitary questions which occupy the whole military medical service during war. The Consulting Surgeons proceed to the seat of war for work with the ambulance detachments, in the field hospitals, and in the stationary war-hospitals; also in the reserve hospitasl they afford advice and help to the surgeons in charge. The convoking the Consulting Surgeons and distributing them to troop commands, either army, army corps, or general etappen inspection, is carried out by the head of the Army Medical Department in Berlin. The activity of the Consulting-Surgeon extends to the bandage-places and the hospitals; but his office is purely professional, being technical and scientific. He has no authority over the Staff, nor can he interfere with the administrative or sanitary arrangements of the medical field services.

After a battle, the Consulting-Surgeons work at the head bandage-places, affording advice and assistance on the spot; but they are more generally engaged in the hospitals. They go the rounds of the sick establishments in their district as often as possible, timing their visits as far as practicable according to the hours of the regular visits of the military surgeons.

In these inspections the chief surgeon of the hospital mentions any difficulties, and considers with the Consulting-Surgeon the proper means of remedy. The latter is required at the same time to mention everything that occurs to him about the treatment of the sick in general, and anything of importance in particular. If there be a difference of opinion, due attention must be paid to the judgment of the Consulting-Surgeon. In such circumstances, if he finds the further value of his prescriptions opposed by orders, he gives his directions in writing, when the same must be implicitly followed. The responsibility for such directions rest with the Consulting-Surgeon, who will forthwith make known the circumstances to the military medical superiors. It is the duty of the Consulting Surgeons to attend consultations, as well as at the performance of operations, when required by the directing hospital surgeons.

They are also required to answer any summons, and to afford skilled information or reports, through the superior command authorities, to the military surgeons, or to the Staff Surgeon-General of the Army.

It is also a part of their service obligation, during the continuance and after the conclusion of a campaign, to report upon the state of the hospitals in their district, so far as regards their observation of the technical performance of professional duties by the hospital surgeons.

The Consulting Surgeons are required to make it their special duty to watch over the collection and preservation, and to demand the recovery of preparations, for the Museum of Military Surgery; also to take care that with each preparation a sufficient extract from the case-book, and an authentic reference to the latter, is duly furnished for future investigation, if necessary.

C. The Field-Medical Administration of an army corps comprises :*—

1 Surgeon-General for the corps.
2 Division-Surgeons ; being a principal medical officer for each division.
1 Assistant-Surgeon ; senior of the grade.
1 Field-Hospital Director.
1 Staff-Apothecary.
4 Hospital-Helpers, one for the Surgeon-General, one for each division, and one for the Field-Hospital Director.
7 Train soldiers ; one driver and one bàtman for the Surgeon-General, and a bàtman for each of the Division-Surgeons, the Field-Hospital Director, Assistant-Surgeon and Apothecary.
12 Horses : 10 saddle and 2 harness.

Surgeon-General of the Corps and Principal Medical Officers of Divisions.

The hospitals and all medical arrangements are under the command of the respective generals; but the Surgeon-General is charged with the superintendence of all matters conneeted with the Medical Department and the distribution of his subordinates. The Surgeon-General of the corps advises the General Commanding, respecting the movements and position of the ambulances and the establishment of field hospitals. But by the medical regulations the Division-Surgeon is answerable for the ambulance columns and field hospitals attached to the division to which he belongs, and the Surgeon-General of the corps for the ambulance column with the reserve artillery and the field hospitals not told off to divisions. The Surgeon-General of the corps also engages surgical instrument makers, dispensers, and other subordinates from civil life. He directs the sanitary and medical affairs of the corps on the march and in cantonment or bivouac ; and issues instructions for the formation of bandage or dressing places when an engagement is expected. When a division is detached from the army corps, the Division-Surgeon performs all the duties allotted to the Surgeon-General of the corps ; at other times he acts as Principal Medical Officer of the division in respect of all internal sanitary and medical arrangements.

Sick Returns and Reports.

On the 1st, 19th, and 21st of each month, the Surgeons-General receives from the Senior Medical Officer in charge, a ten-days' sick return furnished on a regular form. The return for the first of the month is accompanied by a report, in which the following points are dealt with :—

1. The position and sanitary condition of the hospitals (this is fully gone into in the first report after the hospital is established).
2. The Medical Service ; ward aud nursing staff, the volunteer aid, and the provisioning of the patients.
3. The state and type of disease generally prevalent.
4. Epidemics and endemics.
5. Contagious opthalmic disease.
6. Important particulars regarding sick or wounded, operations, &c.

The Surgeon-General first examines these returns and the report, and immediately orders such measures in regard to staff, stores, and removal of patients as may be deemed necessary ; the eyacuations of hospitals being effected through the Field-Hospital Director. He then forwards the whole of

* In addition to this Field-Medical direction of an army corps, each army has a Surgeon-General and Staff at Head-Quarters.

the returns with his own remarks to the War Office medical military division.

*Field-Hospital Direction.*—With the view of obtaining an effective and orderly co-operation, as well as due activity of each branch of the Medical Service in rear of the Army, Field-Hospital Directors are added to the General etappen inspection as special appointments. When the army is placed on a war footing, a Staff-Surgeon, as Field-Hospital Director, is appointed for each army corps, and is placed under the general etappen inspection. The latter, if possible, retains one Field- Hospital Director for immediate employment in the event of the advance of the forces in reserve. To the rest of the Field-Hospital Directors, particular districts are allotted, within which they are required to make the necessary arrangements and inspections, under the following heads :— Field-Hospital Director.

1. To inspect the hospital contrivances already existing, in the towns and villages of their whole circuit, and to take care to have forthwith removed, or to take steps for the speedy remedy of all defects and inconveniences.
2. To labour towards providing for the well-being of the wounded and sick, corresponding to the regular evacuation of the hospitals according to regulation.
3. On a forward movement of the Army, to render a regulated medical service disposable, by a well considered distribution of the staff and stores of the established hospitals.
4. To conduct the opening of any new hospitals that may become necessary, the adaptation of existing buildings to hospital purposes, and the erection of temporary sick or convalescent quarters.

Therefore the general etappen inspection notifies to the Field Hospital Directors the various "Field," "Stationary," and "Etappen" Hospitals within their several districts; and directs them to examine any slightly wounded that may be received direct from the bandage places, with a view to their further disposal. The Field-Hospital Director attends to the details of the movements of the field hospitals; he takes instructions from the corps Surgeon-General, and is in direct communication with the etappen Surgeon-General. Each Field Hospital Director is allowed one hospital-helper, one unmounted train-soldier and two saddle-horses.

### D. *Field Medical and Store Reserves.*

To each army corps is allotted a regulation hospital reserve staff, consisting of Medical Officers and subordinates. Each hospital reserve staff comprises the following individuals :— Hospital Reserve Staff.

3 Staff-Surgeons.
9 Senior Assistant-Surgeons.
3 Field-Apothecaries.
3 Hospital-Inspectors.
3 Accountants.
3 Non-commissioned officers, as clerks.
9 Chief hospital-helpers, as ward-masters.
18 Hospital-helpers, or assistants.
36 Military sick attendants, or ward orderlies.
3 Cooks.
17 Train-soldiers, unmounted: 12 for the Medical Officers, and 5 in reserve and for the Apothecaries, Hospital-Inspectors, and Accountants.

This hospital reserve staff is intended for duty in the "stationary war-hospitals," organized under the general etappen inspection. Various persons may be engaged for service in these hospitals, but the regulations require that in each instance an active Military Medical Officer shall be in charge: and the field medical reserve is intended to meet this requirement. This staff may also, provided its numbers permit, be employed, under the orders of the general etappen inspection, in the cantonment and etappen hospitals, as well as with the convoys of sick and wounded proceeding short distances. How employed.

Hospital Reserve Depôt and Supply of Medical Stores.

*Hospital Reserve Depôts.*—Each of these depôts has a regulation equipment, and comprises the following persons:—

1 Officer in charge.
1 Hospital-Inspector.
1 Field-Apothecary.
2 Surgical-Instrument Makers.
2 Non-commissioned officers, as Storekeepers.
1 Non-commissioned officer, as Clerk.
2 Unmounted train-soldiers—one for the officer in charge, and one between the Hospital-Inspector and Field-Apothecary.

These depôts are intended to supply medical, surgical, and hospital stores to various services in the field, and for this purpose are advanced to the immediate rear of the operating army. One hospital reserve depôt is allowed for each army corps, and is placed under the general etappen inspection,—the latter making special arrangements for its movements, halting and issuing stores. These hospital reserve depôts are to be conducted and put up in such a manner as to allow the requisite articles to be speedily issued to the hospitals, and at the same time to be ready for a quick subsequent move. According to regulation, the hospital reserve depôt is located at the "etappen hauptort," or at the nearest station in the vicinity thereof. To this place the stores are brought up by means of railways, or by relays of wagons, and are there deposited.

On the withdrawal of the bulk of the army from this locality, either the entire depots or proportionate reserves are pushed on along the lines of communication.

Etappen-Hospital-Reserve Depôt.

A hospital reserve depôt is retained at the disposal of the general etappen inspection; and immediately previous to an expected battle, it is thrown forward to the vicinity of the army, so as to provide a speedy and abundant supply of medical necessaries.

Requisitions for Medical Supplies.

The requisitions from the field-hospitals for medical and surgical stores are addressed to the Etappen-Intendency; and the latter determines which hospital reserve depôt shall comply with the request. The troops and sanitary detachments do not demand stores to meet their current needs in medicines, surgical dressings, and medical comforts from the hospital reserve depôt; but obtain what they require from the nearest field hospital. The stationary, etappen and other invalid establishments under the general etappen inspection obtain their supplies direct from the reserve depôts. The surgical instrument makers repair the instruments. One of the two instrument makers is detached on the orders of the etappen Surgeon-General, to repair the surgical instruments in use at the various field and stationary hospitals of the district.

Etappen Hospitals.

*Etappen Hospitals.*—Along the lines of communication between the bases of operation and the forces in front, hospitals are formed for the temporary accommodation of sick of the troops proceeding to the front, and of invalids or others returning home. These hospitals are established at regular distances on the lines of railways in occupation of the army at stations about 80 to 100 miles apart, and on the etappen roads at distances of 15 to 20 from each other. The exact localities are determined by existing stations, and towns or villages; the accommodation of each and the other necessities of the forces being considered. Patients do not remain long under treatment in these hospitals, being either cured and sent to duty, or if not likely soon to be fit to rejoin, being passed to the rear for treatment in the regularly established hospitals. On the line of march with larger bodies of troops it is sometimes necessary to form temporary hospitals. These are also designated etappen hospitals, and are managed under the etappen service.

Stationary Hospitals.

*Stationary War Hospitals.*—When, after a battle, the field-hospitals are about to follow the army corps to which they belong, a certain number of chronic cases of serious injury are unable to be removed; and for the treatment of these patients, establishments under the designation of "stationary war-"hospitals" are formed in the vicinity of the recent battle-field.

Under the Etappen Service.

These hospitals are organized under the general etappen inspection, and are independent of the operating forces. The formation of these hospitals is reported, in regular form, to the home authorities, to the provinces to which they belong, and to the War Office. These establishments, although temporary,

may linger on, with a few patients, for some length of time; but the Chief Surgeon is instructed to use every endeavour to close them by evacuating the patients, a due regard being paid to the surgical peculiarities of their cases. From the description of cases that came under treatment in these hospitals, there is no expectation of any man being restored to duty in the field, and, therefore, the only way of disposing of the patients is by transfer to other hospitals further to the rear, in fact, by removal to the reserve hospitals organized at home.

Are temporary and to be closed as soon as possible.

*The Reserve Hospitals.*—For the admission of patients evacuated from the field-hospitals, from the stationary war-hospitals, and from the etappen hospitals, reserve-hospitals are established by the provincial authorities in the rear of the operating army. They exist during the whole period of the war.

Reserve Hospitals.

The situations especially suitable for these hospitals are defined as follows :—

Situations to be chosen.

*a.* Such as are in the immediate vicinity of a railway or water-course, and have a healthy position.

*b.* Where qualified Surgeons are settled, to whom the treatment of the sick and wounded can be transferred.

*c.* Where suitable garrison-hospitals exist, and are available with the required assistance.

According to the regulations, reserve-hospitals are not to be established in fortresses or within fortifications.

In selecting buildings to be converted into reserve-hospitals, it is to be particularly considered that they are beyond the atmosphere of the town, that they are on an open site, and that large gardens or free spaces are to be found in the vicinity, upon which huts can be erected and tents pitched.

In calculating the capacity of these buildings for accommodating patients, a cubic space of 1,200 feet is to be allowed for each bed.

The personal staff is determined by the number of patients for which the reserve hospital is regulated, according to the following proportions :—To each 100 patients, one Surgeon, 2 Assistant-Surgeons, 3 Hospital-Helpers, and 6 Ward Orderlies. For each 400 patients, one Apothecary. Up to 60 patients, one Accountant; from 61 to 150 patients, one Hospital-Inspector; from 150 to 250 patients, one Upper Hospital-Inspector and one Hospital-Inspector; above 250 patients one Upper Hospital-Inspector and two Hospital-Inspectors. If several reserve-hospitals are established in one place, a Medical Officer is appointed as "Hospital-Director." The home or "substitute" Corps-Surgeon-General makes frequent inspections of the reserve hospitals, or specially charges the Upper Staff Surgeons therewith.

## APPENDIX No. IV.

# BATTLE-FIELD SURGERY, INCLUDING THE GENERAL AND SANITARY TREATMENT OF WOUNDS.

By Surgeon-Major THOMAS G. FITZGERALD, F.R.C.S.

Amputations in the field formally forbidden.

ABOUT a century ago, the Staff Surgeon-General of the Prussian Army became so impressed with the excessive mortality attending the ordinary practice of surgery in the war of the period, that he prohibited the Medical Officers serving under him from performing amputations under any circumstances; and as amputating was the only operative proceeding known and practised at that time, this order practically prohibited all surgical operations in the field. This Surgeon-General and the surgeons who supported him, maintained that the wounded did better when left entirely to nature. Thus, about a 100 years ago, the expectant or non-interference system, was adopted by authority. This, however, was before attention had been given to the several periods after the injury at which amputation should be performed; but when, subsequently, the distinction between "primary" and "secondary" amputation became established, and surgeons learned to select the time for operating, the mortality in military practice decreased, and amputating again came into general favour.

During the last 20 or 25 years various modifications of surgical procedure have been proposed and adopted, and there is now greater need than ever for careful examination and discrimination before undertaking an operation in cases of injury received in battle.

Existing rules of Prussian Medical Service.

Under the existing regulations of the Medical Service of the Prussian Army, the performance of primary amputations is discouraged, and that of resection of joints is forbidden at the bandage places on the battle-field. This rule possesses the great advantage of securing a careful examination of injured limbs before surgical interference is had recourse to, often saving a man from being maimed, affording better opportunities for the study of surgery, and furnishing more accurate statistics regarding battle-field injuries; but, unhappily, a great many lives are sacrificed—inasmuch as many necessary amputations are obliged to be done in the field hospitals,—after the lapse of some days—at the most unfavourable period for a successful result, and when the prospect of saving the patient is at a minimum.

Amputations at an early period very successful.

There is abundant statistical evidence derived from all wars that early amputations in cases of gun-shot wounds are attended with great success, whereas those performed at a later period have proved exceedingly fatal.

The division of amputations into "primary" and "secondary" marked a very great advance in military surgery, and the subsequent introduction of the term "intermediate" (R. Alcock) was a further improvement in the distinction of the periods at which amputation should or should not be preferably performed. These designations, however, referred to dates after injuries corresponding to well-known local conditions; but they did not sufficiently recognise the state of the patient as an important element in the choice of the time at which the operation should be undertaken.

Subdivision of primary amputations.

Surgical writers have generally laid down the periods at which the conditions of "shock" and "reaction" occur, and many even of the older authorities appear to have recognised an ante-shock period, or interval between the stroke of the missile and the beginning of the shock. Wiseman, the patriarch of British military surgery, advises the surgeon to operate "while the soldier "is in heat and in mettle." Ambrose Paré, Guthrie, and Larrey, advert to a stage anterior to the shock during which amputation may be performed.

The American surgical writers have subdivided the primary and intermediate amputations, naming five periods for the performance of the operation, viz:—1. Direct, or prior to the shock; 2. Immediate, or during the shock; 3. Reactionary, or during the period of reaction; 4. Intermediate, or during primary inflammation of the wound; 5. Secondary, or during the suppurative stage. American divisions.

The term shock, as used by surgeons writing in the English language, and especially our own authors, is somewhat vague; and although in many instances a certain lapse of time is unquestionably observed between the receipt of the injury and the setting in of collapse or shock, yet this period is too uncertain, and too short, to permit of a distinction in military practice being established between the amputations performed before the setting in of collapse, and during the existence of such condition. I am inclined, therefore, to have one class prior to reaction; but I think the third and fourth divisions of the American authors should be fully recognised, and I am inclined to believe that one of the surgical results of the recent Franco-German war will be to subdivide the secondary amputations into two or more sections,—corresponding to the condition of the patient,—in which the performance of operations will be definitely acknowledged to be attended with different rates of mortality.

By far the greatest mortality follows amputations undertaken during the stage of primary inflammation of the hurt, between the third and the seventh day after the injury, both days being included. These operations are excessively fatal, and those even of minor importance, if performed at this time, are very frequently fatal. Even the extraction of a bullet, or the surgical examination of the wound, should be avoided during the stage of inflammatory traumatic fever. The next most unsuccessful amputations are those done subsequently to the seventh day, when the suppurative stage has become fully established. Mortality of amputations at various periods.

Amputations performed before the end of the second day,—before the stage of reaction passes into the subsequent inflammatory conditions,—are much more favourable than those done at a later period; but of early amputations, those done during the stage of reaction have less favourable results than those performed before or during the shock. Generally, hitherto it has been during the period of reaction—from the sixth hour to the end of the second day—that so called "primary" amputations have been performed in military surgery; and these have been successful, as compared with secondary amputations: but in naval surgery, from the facility of the injured man being carried instantly from the place where he falls to the surgeon's operating table, the naval medical officers have been enabled to operate before the shock had come on, and hence many older naval writers on surgery draw attention to the importance of operating at this early period. Older military surgeons, as already stated, refer to it, but do not appear to have had much practical experience of its advantages. In military surgery. Direct amputation in naval surgery.

There is no doubt that if amputation of a limb be necessary, the earlier the operation is performed the better for the patient's prospect of ultimate recovery. If a careful examination can be made by a skilful surgeon directly after the receipt of the injury, the surgical course to be adopted should be decided upon, and amputation, if necessary, should be done on the spot, without delay:—if possible, before the shock, but if this be impossible, the operation should not be delayed on account of the existence of this condition. The surgeon need not wait for reaction, and the administration of stimulants or warm drinks to promote reaction previous to operation is rarely necessary. Stimulants and restoratives may be given after the operation. Amputations should be performed as early as possible. Surgeons should not wait for reaction.

In my visits to the numerous French and German hospitals in various places during the recent war, frequent opportunities occurred of observing the different results and rates of progress of cases of amputations performed at the early periods, and those in which it had been delayed until a later date.

In the same hospital, were frequently seen men who had undergone amputation on the field of battle, steadily progressing towards convalescence, making rapid and good recoveries, moving about and cheerful after a few weeks, whilst in neighbouring beds were other men, who had been injured in the same engagement, but had not been operated on until some days later, sickening and dying, or with the prospect of a prolonged course of hospital treatment, extending over a duration of many months. Cases of Primary and secondary amputations in same hospital.

amputation performed very early, before reaction, seemed very often to escape pyæmia, the almost sole remaining scourge of military surgery in the field hospital. Gangrene and erysipelas, which used to prove so destructive had been almost banished, and, consequently, early amputations furnished better results than had previously been obtained.

How improve Surgery in the field.

If at any future time, the practice of military surgery in the field is to become even moderately satisfactory, and officers or men injured in battle are to have a fair chance of surviving their wounds, the change will probably be effected by the adoption of more complete, perfect, and detailed arrangements for the surgical examination of the injured, and the performance of all necessary surgical operations on the battle-field within a few hours of the receipt of the injury. The experience of this, and of previous wars, has proved the necessity of not delaying an operation, even of the most serious magnitude, until the patient can be accommodated in an established hospital, however near to the scene of action. To delay the examination for some days very seriously affects the patient's prospects of surviving, and to undertake an important operation after the second day—from the third to fifth—is often to consign the patient to the grave.

Operations should not be delayed.

Up to the present time the regulations and instructions regarding the performance of surgical duties at the "bandaging" or "dressing" places, on the field, have been very imperfect, not unfrequently entirely deficient. The issue of these instructions being left to the principal medical officer, who is generally of long service, and not very active, no effort is made to render them suitable to circumstances. Hence medical officers attached to dressing-places have hitherto acted according to their individual inclinations and knowledge, unaided by instructions, some surgeons merely applying a piece of wet lint and a bandage, or charpie saturated with some bland fluid, such as glycerine and water;* or, thinking they had an aptitude for operating, they have cut off limbs without due consideration, and thus military surgery in the field has almost universally obtained a bad reputation. Probably influenced by this reputation, the Prussians have laid down the rule, discouraging surgical operations on the field. This is certainly better than the previous haphazard system. But there would appear to be no valid reason why, after a battle is ended, the bandage or dressing places should not become real centres of exact surgical diagnosis, and of proper operative interference, provided the necessary dispositions be made, and suitable measures be duly taken by the superior medical authorities. Full examination, and any surgical operation that may be required by the nature of the case should be performed as soon as possible after the receipt of the hurt:—if possible within an hour, or if that be impossible, within six hours, and it should in no instance be delayed beyond the second day. To institute a careful surgical examination, or to perform surgical operations after two days have elapsed from the receipt of the injury, very seriously increases the risk to the patient's life. As has been stated elsewhere, numerous points of inflammatory infiltration, consisting of wandering white cells and granular matter, form in the substance of the muscles and soft textures in the vicinity of a gun-shot wound. To operate where these are forming, and at the commencement or during the course of the traumatic inflammatory or suppurative fever, will probably render the occurrence of pyæmia or osteomyelitis almost certain. Full examination and necessary surgical operations should be performed in the immediate neighbourhood during an engagement, and after the action on the actual battle-field.

Examination and operation after a few days.

Operating stations on the battle field.

If this suggestion were adopted, the dressing or bandaging places, to which the wounded are brought as they are collected from the battle-field, would become surgical operating stations where all the real primary surgery would be undertaken. The patients subsequently would only require proper after-treatment and good nursing, which would be afforded in the field or stationary hospitals to which they would be removed. Of course, in the case of a very advanced field hospital established in the immediate vicinity of the scene of action, to which wounded could be brought direct from the battle-field, it would, in respect of operating, be considered a "dressing" place. In fact, I

* To speak of "necessary dressings" until the injured man can be examined is simply nonsense. Until all requisite operations have been performed no dressings are necessary or even beneficial.

consider that the wounded should receive all necessary surgical attention, including operations, at the points to which they are first brought, whether it be a "dressing place" or an "advanced field hospital." For the efficient working of this arrangement, it would be necessary that the medical officers known to be skilful surgeons and expert operators, should be attached to the dressing stations, and neither accompany the troops into action nor remain in the rear with the field or stationary hospitals. Secondary operations and later surgical interference should be undertaken in the general or reserve hospitals at the base of military operations. Dressing place or advance field hospital.

*Method of Amputating.*—The plan most generally practised by the surgeons in the German field hospitals was that known as the circular method, and this appeared certainly to afford very favourable results, so far as union and healing was concerned. During the American war, a combination of the flap and circular methods was found to afford excellent results, and considering all the circumstances attending the practice of military surgery, I am inclined to think this combination is by far the best method of amputating on the battle-field. Flap operations, such as we practice in this country, with a large substance of muscle in the flap, are clearly unsuited for military surgery in the field. This was settled beyond dispute by the British experience of the Crimean war, when after Alma and Inkerman, flaps cut according to the recognised pattern almost universally sloughed, and found their way into the chamber utensil, or other refuse receptacle, in place of remaining on the man's limb. The same was observed during the recent war. Flaps made according to the ordinary form do not survive the conditions in which the patients are placed, and almost invariably slough. The best plan of amputating under these circumstances is by a flap operation through the skin, and circular through the muscular and other tissues, the latter being somewhat retracted, and the bone cut a little higher. This operation takes longer to perform, and does not afford quite so good a stump as a successful case of ordinary flap amputation; but the patients do better, and there is much less risk of sloughing. This modified operation admits of several combinations of the flap and circular methods, to suit particular situations of injury or special circumstances, such as the extensive and irregular damage to the subcutaneous soft parts. The cases treated by this plan of operating also bear removal with much less injury than those in which the ordinary flap operation has been employed, and require much less surgical attention and less dressing care during transport. Flap through the skin and circular through the muscles.

I had the opportunity of seeing very interesting cases that had been treated on a peculiar plan. During the early part of the recent war, M. Sedillot, the distinguished French surgeon of Strasburg, who had charge of an enormous number of wounded at Hagenau, recommended that, in districts rendered impure by aggregation of considerable numbers of wounded, and in localities contaminated by the imperfect burial of a great many killed, amputations should be performed in such a way that the bone should project beyond the soft parts, the divided skin and subcutaneous tissures being closed around it, so as to render the exposed cut surfaces as small as possible; the projecting portion of bone to be afterwards removed by operation. Two months subsequently, however, he made a further communication to the profession, giving the results of his own experience of the proposed mode of proceeding. He states that osteomyelitis and periostitis almost invariably followed amputation under such circumstances, giving rise to new osseous formation to an enormous extent, destroying and inclosing the old bone in a bony growth of considerable magnitude. He withdraws the previous recommendations, and advises surgeons against making any further trial of the method he had proposed. The cases that came under my observation displayed a most extraordinary and excessive growth of new bone, forming enormous irregular masses. Sedillot's operation. Abandoned by the author.

### *Sanitary and General Treatment of Gun-Shot Wounds in "Field" and "Stationary" Hospitals.*

In the practice of military surgery, the main general principle to be observed is extreme cleanliness, complete absence of foulness or dirt in all the various surroundings of the patient. This question of purity applies not only to the atmosphere of the hospital and its vicinity, but, so far as the wounded Extreme cleanliness in all the surroundings of wounded.

are concerned, in a still greater degree to the surgical attendance, the dressings, the nursing, as well as the preservation of the bedding from contamination, the dealing with excreta, soiled linen, and foul material of all descriptions. In fact, the most scrupulous cleanliness in every particular, and in all details, should be strictly enforced. The surgeons, their assistants, dressers, and ward-attendants, should be thoroughly clean in their persons and apparel:—the wearing of old woollen clothes or soiled garments should be avoided, and the subordinates should be clothed, while in attendance upon the wounded, in recently washed linen coats and trowsers.

Surgeon and assistants on leaving one surgical case to visit another, should invariably wash their hands either with soap and water, or still better, in Condy's fluid diluted, a vessel containing which should accompany the surgeons on their visits to surgical patients. Merely dipping the hand into water, or wiping on a towel, is insufficient, and is fraught with danger to the next patient that may be touched.

Surgical materials and appliances to be used only once, and cutting instruments to be sent to the cutler.

All surgical instruments after having been once used, should be thoroughly cleaned. Forceps, scissors, spatulas, probes, &c., should be well cleaned before being employed for another patient, and cutting instruments should be sent to the cutler before being used a second time. An amputating knife, a bistoury or a scalpel, should under no circumstances be used twice even on the same patient, without passing through the cutler's hands.

All dressings, whether obviously soiled or not, should be received into a solution of permanganate, and burned or buried without delay. Bandages, oiled silk, or gutta percha, should on no account be employed a second time, even on the same patient. Sponges, if used, can only serve once, and surgeons' needles, common needles and pins, used for suppurating cases, are to be thrown away. The receptacles containing the fresh dressings, should not be placed on a patient's bed, but should be left at some distance in the centre of the ward, and the necessary articles brought to the surgeon or dresser. It is a good plan to divide the lint, bandages, oiled silk, &c., into separate dressings, so that the bulk of these articles may remain uncontaminated when a dressing is required. Ligatures should be cut fresh, and suture or common thread renewed in the ward every third or second day.

The utmost care should be observed with regard to the bedding. If possible, two beds should be allowed to each severely wounded man, and means should be taken to preserve the mattress from contamination. On the admission of a recent case of gun-shot injury, there is usually a considerable oozing of blood, which saturates the bedding, this undergoing rapid decomposition, gives rise, in a day or two, to a peculiar, most offensive, and sickening emanation. The odour of blood stains in connection with the warmth of the body is well known to any surgeon who has been near his patient when the bed clothes have been raised under such circumstances. Therefore, an ample supply of bed linen is essential, and blood-stained sheets, &c., must be changed without delay. Waterproofs used to protect the beds should be well washed, and then carefully rinsed in Condy's fluid diluted.

Blood stained and soiled linen and clothing to be immediately changed.

The blood-stained and soiled clothing, including under clothes, should be removed, and the patient should be clothed in well-washed hospital garments before being put into bed; and if he can be immediately, or without delay, sponged with a weak solution of chloralum, or washed with carbolic soap, so much the better. His own clothes, kit and knapsack should under no circumstances remain in the ward, even for a short time.

Offensive matter and infected clothing to be dealt with by persons unconnected with the sick.

All offensive matter, excreta, &c., should be immediately thrown into receptacles containing a solution of sulphate of iron or of chloride of zinc, to be buried, at short intervals, by persons unconnected with the service of the wards.

Ample cubic space, sufficient superficial measurement to the beds, and free cross ventilation should be ensured; but the contaminating power and peculiar odour of suppurating wounds is so intense, that the most perfect arrangements, in regard to ventilation and cubic capacity, fail to purify the air in the vicinity of a patient suffering from profuse suppuration. It may be mentioned here, that simple flesh wounds, and other cases of slight injury, are often accompanied by excessive purulent formation, the suppuration extending in various directions, to considerable distances from the original wound, under the skin, between the muscles, and along the fasciæ or bones. Enormous

quantities of pus are produced, penetrating vast tracts of the connecting tissue, and involving the entire limb and portions of the trunk. In this point of view, many injuries returned at first as slight become most serious in their ultimate consequences. The peculiar offensive and sickening odour of surgical wards does not depend solely on the number of seriously injured, or on the crowding of patients, but on the proportion of freely suppurating wounds under treatment. The air of wards occupied by such patients becomes thoroughly contaminated—the result is most sickening—and proves very deleterious to the health of persons breathing the air. Surgeons and dressers closely occupied during several hours a-day rapidly lose their health, become feverish, their appetites become impaired, bowels irregular, abrasions existing on their hands are prone to take on unhealthy action, and to suppurate, or sores form independently of the previous existence of abrasions. This impairment of health is observed only amongst the persons engaged in actual personal attendance on the wounded; and the household officials and subordinates employed in the domestic duties of the hospital escape. This was remarkably the case in the hospitals at Scutari during the Crimean War, where the surgeons, dressers, nurses, and ward orderlies were attacked in considerable numbers by disease, while the purveyors, dispensers, cooks, and storemen, whose duties did not bring them into proximity with the wounded generally escaped. The persons so affected, however, do not become affected with multiple abscesses or diffuse suppuration.

Persons employed in attendance on wounded become sick but are not attacked by pyæmia.

This impure condition is what is known as hospital miasm, and is entirely different from the impurity of the air dependent on simple crowding together of a number of persons. The principal object to be obtained in the sanitary treatment of wounded is to prevent this miasm or impurity arising from suppurating surfaces, or from decomposing blood and discharges being poured into the surrounding atmosphere

Hospital miasm.

The splitting and smashing of bones by the conical rifle balls of modern warfare is so very considerable, and the consequent suppuration so extremely profuse, that ordinary surgical dressings quite fail to exert any influence on the purulent discharges. The *only* preparation that appears, in a general way, to have any effect in counteracting the deleterious influences of the discharges in such cases, is picked oakum, carefully and freely applied. This material absorbes the pus, prevents its decomposition, keeps the injury clean, and protects it from contamination by the surrounding hospital miasm, and tends to preserve the purity of the ward atmosphere. Fibres of oakum and similar materials appear to be thoroughly impregnated with various anteseptic hydrocarbons which are insoluble, and, consequently are with difficulty washed out by the flowing discharges. The preservative powers of these elements, and of the constituents of peat smoke in curing meats and fish are well known, and somewhat similar influence appears to be exerted by oakum dressings in preventing the offensive miasm of suppurating wounds from contaminating the surrounding atmosphere. Carbolic acid solutions, and carbolic oil dressings, do not seem to possess the same power, and irrigations, however frequent, by carbolic acid or permanganate solutions, are quite inadequate.

Prepared oakum.

In dressing suppurating wounds, oakum should be equally teased out, and applied in several layers, each successive layer extending slightly beyond the limits of the one beneath, and a considerable quantity of the material should be placed beneath the limb, or, at least, wedged in between the limb and the splint or appliance on which it is placed.

Mode of applying picked oakum.

By timely incisions into neighbouring collections of pus, aided by the immediate application of oakum, freely and carefully employed, the purulent miasm emanating from suppurating wounds may, to a considerable extent, be prevented from entering the surrounding atmosphere.

Having thus taken measures to prevent the atmosphere from being specially contaminated, and due provision being made to prevent the wards being overcrowded, it becomes necessary to see that the patient is protected from the depressing influence of cold. This is of serious importance, for in the recent war during the cold weather, in wards freely open to ventilation, wounds were observed to take on unhealthy action, to become covered with a diphtheritic coating, and the patient to become depressed, requiring the administration of stimulants. On warming the rooms, and giving the patient

Heat and warm bedding necessary in cold weather.

additional bed clothes, these conditions ceased. Hence, although free ventilation is desirable; it is at the same time, necessary that the bedding and bed clothes be sufficiently warm and ample, and that the rooms be artificially heated during the cold weather. The temperature of the wards should not be raised by doubling the doors, or hanging heavy curtains before them, or between the patient's beds and the windows or doors.

Evacuating of wards at intervals.

When a considerable number of wounded have been treated in several adjoining rooms of the same building, fresh wounded should not be admitted into the wards were old cases are under treatment. It is a better plan, as beds become vacant in a ward, to remove patients from other rooms, so as to empty certain wards, which may be thoroughly cleansed before being again filled with new patients suffering from recent injuries.

*Disinfection in the Prussian Army Medical Service.*

The following agents are employed as means of disinfecting:—

Permanganate of potash or soda.
Carbolic acid.
Chloride of lime.
Sulphates of iron and zinc, and chloride of zinc.
Sulphur.
Charcoal.

1. For wounds and sores, a solution of either an alkaline permanganate, or of carbolic acid, is employed by preference. These solutions are applied by means of the irrigator,—each patient being provided with a separate injecting nozzle.

Prepared oakum and carbolized tow was most extensively employed. Dressings of this material being applied either direct to the suppurating wound, or a piece of lint or linen intervening, the former mode being most effective.

2. For the disinfection of excreta, the sulphate of iron—solution 1 : 30 or 40—or carbolic acid is employed. The former was found to be very effective for this purpose.

3. The disinfection of body and bed linen is safely effected by washing in a sufficiently strong caustic potash or soda solution, or lie.

The linen of patients suffering from typhus, small-pox, and other eminently infectious diseases may be, first of all, allowed to remain some hours—12 to 36—in a solution of chloride of lime, of carbolic acid, of sulphate of zinc (1 : 120), or of chloride of zinc (1 : 240), and should then be well washed in the ordinary mode.

4. For the disinfection of the straw-bed sacks, and of the matresses, the covers are treated like the bed linen, the straw burned, and the wool boiled.

The bedsteads are washed with a solution of chloride of lime, of carbolic acid, of sulphate of zinc (1 : 80), or of chloride of zinc (1 : 160), and subsequently with soap and water.

5. Garments are most safely disinfected by heat in an oven (75° to 90° R.). In default of an oven, the disinfection is accomplished by prolonged soaking in a strong solution of the materials already mentioned, and subsequent washing or by means of sulphur or chlorine fumigation.

6. In the disinfection of quarters, sick rooms, stables, &c., preference is given to chlorine, carbolic acid, and sulphurous acid. These agents being employed in empty rooms, the doors and windows are closed. The chlorine fumigation is worked in this way: upon one pint of chloride of lime, in an earthen dish, is poured 1½ pints of crude hyrochloric acid. The room is then left about 12 hours under the working of the chlorine gas, and then the doors and windows are opened freely. In rooms in which a patient with infectious disease has been treated, the floors and walls are carefully cleaned with a solution of a caustic alkali or of lie, chloride of lime, a solution of sulphate of zinc, and subsequently, a new coating of paint or colouring.

Infected articles of little value, of which the disinfection would be disproportionately costly and carried out with great trouble, are burnt; this is done unconditionally with all used charpie, compresses, and old linen, whether employed as dressing material, or such as has been made use of in infectious diseases.

## APPENDIX No. V.

## ON THE PERPETUATION OF ATTITUDE AND FACIAL EXPRESSION WHICH IS OCCASIONALLY MET WITH IN SOLDIERS WHO HAVE BEEN KILLED BY GUNSHOT ON FIELDS OF BATTLE.

By Deputy Inspector-General T. LONGMORE, C.B., Professor of Military Surgery, Netley.

A PECULIAR phenomenon now and then follows gunshot wounds of a fatal character, which, whenever it is observed, invariably makes a strong impression on the imagination of the beholder. This is the fixation of bodily attitude that, in the occasional instances alluded to, at once follows extinction of life by the stroke of a shot, without any interval of muscular relaxation such as ordinarily occurs after death, and which, when it occurs in the facial muscles, leaves an absence of all expression excepting one of placid repose over the pallid features of the corpse, presenting a remarkable contrast with the violence by which the death has been produced. In the exceptional cases under consideration, the attitude of life, the very act which was in progress of performance by the soldier concerned, the expression of his countenance indicating the feelings under which the action was being performed, all arrested by the fatal shot are perpetuated in death. The breathing, passionate actors have been instantaneously, as in the fable of Medusa, converted into lifeless fixed statues. The phenomenon just noticed attracted attention on several occasions during the late Franco-German war, as it had already done in previous wars; and some striking representations of the strange appearances resulting from it appeared in some of the illustrated journals whilst the strife was in progress.* These pictures were regarded by many persons as imaginative exaggerations, but those who were better acquainted with the subject were able to appreciate their faithfulness. Several examples of similar fixation of attitude and expression had attracted my own attention in walking over the battle-ground of Inkerman, and probably most persons who have passed across a battle-field have witnessed here and there an instance of the same strange appearance among the dead. Instances of partial instantaneous muscular rigidity, in which limited portions only of the body have been rendered rigid, are by no means rare on such occasions. A weapon held firmly in the tightened grasp of a dead soldier, perhaps in the attitude of aiming at some object—a hand stretched out to lay hold of something—the lower limbs fixed in the posture of marching or running—may not unfrequently be seen; all serving to show that no muscular relaxation could have taken place in the limbs concerned, either at the time when the lives of the wounded men were extinguished or afterwards.

A few observations on this topic occur in Dr. Chenu's Report to the Sanitary Council of the French Army on the Eastern Campaign of 1854–56.† Some of these remarks have reference to the attitudes of the dead observed on the field of Alma, and were furnished by a French military surgeon, M. Perier. "As I traversed the field of battle of the Alma," writes M. Perier, "the "day but one after the action, my astonishment was great on perceiving "here and there a considerable number of Russian corpses which preserved "postures and expressions of face still presenting the image of life. Some "appeared to be in the act of speaking, some smiling," &c. Dr. Chenu also

* See, for example, the drawing of the "Last Bivouac," in the "Graphic" of January the 7th, 1871.

† "Rapport au Conseil de Santé des Armées sur les resultats du service Médico-Chirurgical aux Ambulances de Crimée, &c. Par J. C. Chenu, &c. Paris, 1865, p. 631.

inserts the following notice of the appearances of the killed after the battle o Inkerman :—"Some faces appeared to be smiling; others to be still angry and "threatening. Some corpses had funereal attitudes: one would have said "that friendly hands had arranged them for the tomb. Others had remained "with one knee on the ground, grasping convulsively their firearms and biting "their cartridges. Several had an arm raised, as if in the act of parrying a "blow, or of formulating a supreme prayer when yielding their last breath. "The features of all these corpses were pale, and the wind, which was blowing "with force, appeared to be almost reanimating them." A study of the influence of fatal injuries in particular parts of the body in determining the directions in which the killed fall to the ground follows, but hardly bears on the particular subject of this paper.

The phenomenon of instantaneous rigidity on battle-fields has been recently discussed by Dr. J. M. Rossbach, of the University of Würzburg, in an interesting essay in Vichow's Archives;* and the conclusions which the author has arrived at in this essay, appearing to me as they do to be hardly tenable when thoroughly examined, have led me to make the following remarks on the subject. Dr. Rossbach has mentioned, among several others, two remarkable examples of general instantaneous rigidity from gunshot wounds, one from his own observation during the late Franco-German war, the other from an American source. These instances illustrate so forcibly the phenomena of which I am writing that I am led to quote them.

The following is Dr. Rossbach's account of the example observed by himself:—"A group of six Frenchmen were all killed by a single shell in a "moment, as they were sitting in an excavation of the ground taking their "breakfast. The shell in an entire state had struck the back of a soldier who "was sitting in the midst of the group, had burst in his body, and had torn "asunder and burnt a great part of his trunk down to his thighs. Simul-"taneously all his comrades were killed by fragments of the shell flying around. "The skull of one was torn away as he was just laughing at some comical "observation of his neighbour. The man sitting next to him had lifted a "tin cup, which he was holding between his thumb and forefinger close to "his lips; the rim of the cup touched the under lip just as his whole skull "and face, with the exception of the lower jaw, were torn away. The soldiers "thus instantaneously killed could not fall on account of the form of the hollow "place in which they were sitting, and also on account of their close proximity "one to another, and so it was that I found the one last-mentioned still in a "half-sitting, half-lying position, 24 hours after he was killed, while he held "the cup with his unsupported raised hand up to his headless lower jaw."

The second instance described by Dr. Rossbach occurred during the War of the Rebellion in the United States, and was first recorded by Dr. Brinton† A Cavalry soldier of the Southern States was killed instantaneously by a rifle bullet as he was trying to escape. He was just about to mount his horse, which he had not noticed was still fastened by one picket, when the shot struck him. His pursuers speedily arriving found him dead, with his left foot in the stirrup, and his right foot on the ground. His left hand held the bridle and horse's mane, his right his carbine, the butt end of which was resting on the ground. His head was turned backwards over his right shoulder, just as it was in his last moment, when he was looking back at the approaching enemy. There was some difficulty in loosening the left hand of the dead soldier free from the horse's mane, as there was also in freeing the right from the carbine; and when this was at last accomplished and the corpse was lying on the ground, it remained quite rigid, and still retained the attitude described."

Similar instances of the persistence of bodily attitudes in men and animals that have been suddenly killed by lightning have been recorded. M. Boudin in his remarks on the different effects of lightning as studied on the bodies

* "Ueber eine unmittelbar mit dem Lebensende beginnende Todtenstarre." Von Dr. J. M. Rossbach, &c., R. Virchow's Archiv. Vol. li., 1870, p. 558.

† Dr. Rossbach quotes this from the "Allgemeine Militärarztliche Zeitung." Wien. 1870. No. 24. I have not seen the original source from which the history of the case was derived.

of those who have died from having been struck by it, devoted a chapter to the subject of "Death, with preservation of the posture which the man was in at the moment of being killed by the electric fluid." Among other examples in illustration of this effect he quotes one which bears a striking resemblance in some particulars to the case witnessed and described by Dr. Rossbach. It is this: Eight reapers were taking their meal under an oak, when they were all killed by a flash of lightning. Their bodies were rendered quite rigid, and remained in that condition, so that one appeared holding a cup, another drinking, a third putting his hand in a dish, a fourth eating, and all, some in the act of doing one thing, some another, dark and livid as statues of bronze.*

These and like instances might at first lead to the conclusion that this lethal rigidity, by means of which the act and posture of the living man have been so startlingly preserved after death, is in some way the result of the instantaneous nature of the injury to which he had been subjected. But this same kind of rigidity—rigidity supervening on the occurrence of death without any interval of muscular relaxation—is equally witnessed in occasional cases when the attitude or the act perpetuated through its means sufficiently show that the extinction of life has not been sudden. Hands elevated in the attitude of prayer, hands stretched out as if to attract notice and bring help, the removal of accoutrements, the release of uniform to diminish constriction, dressing the wound which has been inflicted, and other similar acts arrested by death have been still maintained so far as concerns posture after death; and these cases bear sufficient witness both to the wounds not having been at once mortal, and to the fact of no muscular relaxation having occurred when at length death did come to the relief of the sufferers. Dr. Rossbach mentions among the dead observed by him one of a German soldier shot in the chest, who had succeeded during life in extracting from his knapsack the photograph of his wife or some person dear to him, and this photograph was still held in the rigid hand before the face of the corpse. Another had succeeded in unfastening his knapsack and taking out from it a bandage, which he was trying to apply to the wound when death took place. The dead soldier still held the bandage in his hand. In all such cases it is obvious that a period, more or less long, must have elapsed between the infliction of the wound and its fatal result, while, equally the same as in the instances when death was instantaneous, no condition of relaxation, such that gravitation might have exerted its influence, could have occurred.

In the following instance it was doubtful whether the position in which the corpse was found had been assumed some time after the fatal wound was inflicted or whether it represented the posture in which the deceased officer was in at the moment of being hit. My friend, Dr. Mackinnon, was on duty in the trenches before Sebastopol on the night following the day of the final assault, and was among the first to enter the Redan in the morning after it was discovered to have been abandoned by the enemy. One of the first objects that struck his attention after getting into the work was a Russian officer sitting upright upon a gabion. His two arms were folded together across his chest, his eyelids were closed, and he appeared to be sleeping. Deceived for the moment by this appearance, Dr. Mackinnon placed his hand on his shoulder to rouse him, and then discovered that he was dead and rigid. He had been shot by a rifle ball in the left breast. There was nothing to show whether he had sat down on the gabion after being wounded, and had so died, or whether he had happened to be sitting there at the moment of being killed; in either case, there could not have been any interval of relaxation after death, or the erect attitude of the upper part of the body and the crossed position of the arms manifestly would not have been maintained.

Dr. Rossbach has come to the following conclusion in explanation of this subject. As it is impossible, he writes, to assume that any vital action or muscular contraction could take place, or continue to last, after death, it, seems to be beyond doubt that *rigor mortis* must have set in with a lightning-

* "Traité de Géographie et de Statistique Médicales," &c. Par J. C. M. Boudin Paris. 1857. Tome i, p. 519.

like rapidity just between the last moment of life and the first moment of death, and was perhaps the end or result of the last muscular contraction. Had the rigor set in, say even only a minute after death, the relaxation of the muscular contraction would have been the consequence, and the limbs would have followed the laws of gravity.*

The points that appear to me to be debateable in this explanation are the alleged impossibility of muscular contraction continuing, and the supposition of *rigor mortis* occurring instantaneously on the termination of life. Other physiological observations appear to me to be opposed to these assumptions. That no relaxation could have occurred after death, such as occurs ordinarily after this event, in the particular cases under consideration is evident enough from the positions already described in which the dead were found. There can be no doubt upon that point. The doubt is whether this absence of relaxation was due, as described, to the lightning-like rapid seizure of the muscles by *rigor mortis*. The stiffening of the muscles after death, true *rigor mortis*, whatever may be its exact nature, is certainly characterized by being a gradual process, though variable in the duration of the time occupied by the process, as is the interval which elapses after death before its commencement, and as also is the length of the period during which it continues to exert its peculiar effects. So markedly is progressive cadaveric rigidity the general rule, that one feels compelled to try and seek for some other mode of explanation of the phenomena under consideration before deciding them to be due to an exception to this rule—to be due to *rigor mortis* taking place in an inconceivably brief instant of time.

There are other reasons, however, in addition to the gradual nature of the occurrence of *rigor mortis* which militate against the acceptance of the explanation given by Dr. Rossbach. The amount of contraction usually observed in the voluntary muscles prominently implicated in the cases under consideration requires to be taken into account. The contraction is very great, such as is usually only met with under direct agency of the will, or under powerful involuntary spasm. To keep an arm in the position in which it is placed when raised with a cup held in the hand to the mouth, requires the application of considerable muscular force upon the several moveable parts of the limb concerned. So with such cases as the one in which the horse's mane was tightly clutched by the killed soldier's hand, and others in which muskets or other weapons are strongly grasped. As is well known, the muscular contractions which occur under the influence of *rigor mortis* exert no such powerful action upon the parts to which the muscles belong; they must, in the cases before us, be wholly due to influences which have preceded death, to whatever cause their subsequent persistence may be attributable.

All the observers who have particularly studied *rigor mortis* as it ordinarily occurs, though differing from each other in comparatively unimportant details, agree in recording that it takes place in the human body in a systematic way from one part of the frame to another; that, whether its process be slow or rapid, it does not occur universally over the trunk and its members at one and the same time. The general order seems to be for *rigor mortis* to begin in the neck and lower jaw; for the muscles of the face, trunk, and upper extremities to be next stiffened; and lastly, those of the lower extremities. But in the cases under consideration all rules of this kind must be set at naught if we are to accept the explanation of instantaneous *rigor mortis*; the act which was being performed at the instant of death alone must determine the parts where the effects of the muscular rigidity shall be most marked, whether in the lower or upper extremities, or trunk. The attitude perpetuated in the stiffened corpse may be one in which every muscle of the body is more or less implicated, as in the case of the rider about to mount his horse, or one in which those of the upper extremities are principally concerned, as in the instance of a soldier reposing on his back while his arms are maintained in an elevated position above him as in the attitude of prayer; or one in which those of the lower extremities are concerned, as in the case of a corpse

* Op. Cit., p. 562.

in which the act of running is shown to have been preserved. These occurrences, so contrary to the characteristic and regular order of conditions followed by *rigor mortis* under ordinary circumstances, raise another difficulty in the way of explaining the phenomena under discussion by attributing them to the instantaneous supervention of *rigor mortis*.

A further difficulty is the established fact that the condition of *rigor mortis* supervenes later in well-nourished muscular subjects who die suddenly, than it does in emaciated and debilitated patients. When death takes place suddenly in persons of full muscular development, the irritability of the muscles lasts for a long time, and it has been sufficiently proved that so long as irritability remains *rigor mortis* keeps away.

But we may study this subject more closely still with the aid of the light which has been thrown on the subject of *rigor mortis* by the interesting experiments elaborated by Dr. Brown-Séquard, and set forth in the Croonian lecture which that expert physiologist delivered before the Royal Society in 1861.* The conclusions to which these experiments lead are certainly antagonistic to the supposition of such an event occurring as muscular action being converted into passive fixation by *rigor mortis* without any interval of time between the two conditions.

One notable circumstance in the cases described by Dr. Rossbach, and, indeed, in most cases of a corresponding kind, is the duration of the cadaveric rigidity. In his account of the six soldiers killed by the bursting of a shell, Dr. Rossbach refers to one of them whom he observed still in a state of rigidity 24 hours after death. The same rigid condition of corpses in which attitudes contrary to gravity are exhibited is sometimes maintained even a longer time than one day, as I myself had the opportunity of observing at the burial of some of the dead after the battle of Inkerman. So long a duration of *rigor mortis*, under the assumption of its extremely early occurrence, is quite contrary to the results of Dr. Brown-Séquard's experiments. They established the fact that in animals galvanized to death the more powerful the galvanic current employed, the more speedy was the completion of the state of rigidity, but the shorter its duration. Throughout Dr. Brown-Séquard's experiments a constant relation is shown between the time of appearance of *rigor mortis* and its duration. Thus, in his observations on the corpses of soldiers who had died from cholera, their general results were: "1st, that "cadaveric rigidity appeared late and lasted long in those patients who died "quickly; 2nd, that those muscles which had been attacked with violent and "frequent cramps became rigid very soon after death, and remained so only a "short time."† So in deaths of animals from convulsions, Dr. Brown-Séquard observed that the more violent and frequent the convulsions, the earlier did cadaveric rigidity appear, and the sooner it ceased. Indeed it is stated to be one of the objects of the lecture to establish as a law "the later cadaveric rigidity sets in the longer it lasts," and the facts put forward equally establish the converse, that the earlier it sets in the shorter it lasts. The instantaneous ouset of *rigor mortis*, with its long duration, in the instances cited by Dr. Rossbach, are features worthy of notice, for if Dr. Rossbach's explanation be accepted, they must stand forth as exceptions to the general rule which Dr. Brown-Séquard's experiments have tended to establish.

Previous muscular exertion, whether in the shape of ordinary muscular exercise, or of convulsions brought on by disease, or induced by certain poisons, influences the time at which cadaveric rigidity appears; but it is only when it has been prolonged as well as severe that the *rigor mortis* appears very early, and then, as in other cases, it disappears proportionably quickly. The constancy of this rule is shown in a series of experiments by Dr. Brown-Séquard on dogs, in which the stronger the dose of strychnine administered, and therefore the less prolonged the convulsions before death, the more distant was the time of the advent of *rigor mortis* and the longer the period of its

* Croonian lecture "On the Relations between Muscular Irritability, Cadaveric Rigidity, and Putrefaction." Proceedings of the Royal Society of London, Vol. xi. Lond. 1862, p. 204.

† Op. Cit., p. 212.

duration. When the doses of strychnine administered were comparatively weak and the convulsions proportionably prolonged, the *rigor mortis* appeared earlier, but lasted a less time. In the instance of the men killed by a shell while sitting at their meal, and in that of the Cavalry soldier with his horse picketted, it may fairly be concluded that there had not been any severe or prolonged exertion just before death to lead to very early *rigor mortis*; and in other like cases an allegation of prolonged bodily exercise and exhausted nervous energy being the sources of early *rigor mortis*, and so causing the peculiar fixation of attitudes under consideration will hardly be found to be tenable. In the movements of armies and on occasions of battle, whole bodies of troops are exposed to the same amount of fatigue and exhausting influences, but it is only in a very small minority among those of them that are killed in action that the remarkable phenomenon above referred to is manifested.

Dr. Brown-Séquard's researches extended to ascertaining the influence of nutrition of muscles on cadaveric rigidity, and his experiments agreed with those of other physiologists in showing that while *rigor mortis* sets in very rapidly and disappears speedily when nutrition has been diminished for a long while before death, on the contrary, when death occurs suddenly in persons in health in whom the state of muscular nutrition is very good, *rigor mortis* does not set in until long after the fatal event. His own observations showed that in the bodies of healthy persons decapitated or asphyxiated, cadaveric rigidity does not appear sooner than 10 or 12 hours after death; and he quotes an observation by Dr. Nysten,* in which *rigor mortis* appeared only after 26 hours in the body of a man who had been beheaded. In the instances of soldiers suddenly killed on a battle-field the muscular nutrition will, as a rule, be good, and in this respect again the explanation of *rigor mortis* occurring instantaneously, and the fact of the long persistence of rigidity in the cases under consideration, appear to be irreconcileable with the observations of physiologists.

I need not prolong this list of discrepancies, for all the experiments detailed in the Croonian lecture before quoted plainly show that in persons dying from accidental causes when in full health *rigor mortis* sets in late; that, on the contrary, when persons die exhausted by long illness, by prolonged convulsions, or from other causes, cadaveric rigidity sets in proportionately early; that in proportion to the soonness with which it sets in is the shortness of its duration, and therefore all the experiments are opposed to the theory that *rigor mortis* can set in with "lightning-like rapidity," and can last many hours, in strong and healthy soldiers killed more or less suddenly by gunshot on fields of battle, such as those referred to by Dr. Rossbach, and frequently noticed by other observers.

No other way occurs to me of getting rid of the difficulties with which Dr. Rossbach's explanation is encumbered than by admitting the possibility, under some special circumstances, of organic muscular contraction continuing to last after general corporeal death. The muscles in these cases may have been brought into a state of contraction, either by violent spasm or by intense mental emotion, or exertion of the will, so extreme that, joined with the influence of the arrest of arterial supply and capillary circulation in the parts concerned, they have not returned to their former state or become relaxed, notwithstanding the occurrence of systemic death: after which, more or less quickly according to circumstances and in accordance with what is observed every day under different constitutional conditions at the time of death, *rigor mortis* has gradually invaded the already contracted muscles and preserved them in the very aspects in which they were at the time of their invasion by it. If such an explanation be admissible, the same condition, as far as external observation is concerned, would remain; the cause assigned for the condition would alone be altered. The condition brought about in the muscles by their vital endowments under excessive nerve-stimulation would continue, although the stimulation had ceased to act, solely as a passive

* Nysten, "Récherches de Physiologie et de Chimie Pathologique," 1811, p. 387.

physical condition dependent upon their peculiar structure, and, presuming this to be possible, there would be no reason why death-stiffening should not afterwards gradually take hold of the tissues and perpetuate their contracted condition up to the time of decomposition beginning, when of course the condition would cease. The arrest of the arterial supply and capillary circulation probably plays an important part in the cases under review. This arrest would be universal and of instant occurrence in the cases of instantaneous death; local, and taking place gradually prior to death, in the cases where the nature of the wounds permitted the event to be more or less protracted, and in which the phenomena under consideration are only partially exhibited, as, for example, in the instances where the upper extremities have been found upraised in the attitude of prayer, while the rest of the body has been found lying in a posture consistent with the influences of gravity and of the form of the ground beneath.

The following observation is of interest as bearing on the supposition just noted. A boy recently fell through the ice on a piece of water near Netley, and remained submerged so long that all signs of life had disappeared on his body being recovered. Under the persistent efforts of Dr. Moffit, however, animation was eventually restored. But for one hour and a half from the time when these efforts were commenced it was found impossible by the application of any force within reasonable limits to open the mouth. The lower jaw had become firmly drawn against the upper jaw by the tonic muscular contraction due to the spasm of suffocative asphyxia. The hands were also flexed by similar contraction of the muscles. After the time above named the pulse began to be felt at the wrist, and then, and then only, the muscles began to relax from their contracted state. Had not success attended the efforts made for restoring the suspended animation in this case, but complete death supervened, can there be a doubt that *rigor mortis* would not in due course have invaded the contracted muscles, and so have preserved for a time the clenched jaw and hands just described.

The persistency of muscular contraction, after the causes by which they have been induced have disappeared, is often remarkable. We witness it as an occasional result of injury to nerves in wounds not involving life. Gunshot projectiles causing contusions of motor nerves generally induce violent sudden action of the muscles to which the nerves are distributed and not unfrequently this action is substantially found to continue in opposition to efforts of the will of the persons concerned, notwithstanding that the nerve irritation which originated the contraction had ceased. A mechanical counter force will undo the contraction thus induced, and the contraction will not then return. Several illustrations in point may be incidentally noticed in the published histories of the gunshot wounds and injuries of nerves which occurred during the war of rebellion in the United States. I select the following. At the second Bull Run battle, Augnst 29, 1862, J. H. C., while ramming a cartridge, was shot in the left arm, three inches above the internal condyle. The ball injured the median and ulnar nerves. "The fingers of both "hands flexed and grasped his ramrod and gun tightly. Bringing the right "hand, still clutching the ramrod, to the left elbow, he felt the blood and knew "he was wounded. He then shook the ramrod from the grasp of his right "hand with a strong effort, and unloosed with his freed hand the tight grip of "the left hand on the gun," &c. A. Z. was wounded at Chancellorsville, May 3rd, 1863, by a piece of shell, which fell on the inside of the arm, just below the axilla. The skin was torn slightly, and the parts severely bruised. "His fingers clutched the ramrod which he was using, and it required force to "unlock the grip." H. W., while moving at double quick pace in the Wilderness, May 5, 1864, was shot in the left arm. The ball entered 3½ inches above the internal condyle of the humerus, and emerged directly below the anterior angle of the axilla. It passed over the nerves, injuring the ulnar especially. "He felt violent pain throughout the limb, which was instantly "flexed at every joint, and so continued for 15 minutes, when it was extended "by the other hand.*

* "Gunshot Wounds and other Injuries of Nerves." By S. W. Mitchell, M.D., G. R. Morehouse, M.D., and W. W. Keene, M.D., Phil. 1864, pp. 94, 107, and 109.

In these cases the nerve injury induced instantaneous extreme muscular contraction, and this did not relax when the nerve shock had passed; the muscular fibres retained their contracted condition until a counter-force was applied. In certain forms of ordinary cramp the same thing occurs. Either from direct stimulus, or some reflex influence. the cramp is induced, and though the original cause of irritation may cease, the cramp remains until by pressure or by other means the contracted muscle is made to resume its former state.

The continued grasp by a drowned person of any object he may have caught hold of during life; the persistent muscular contraction remaining after poisoning by strychnia and after occasional cases of tetanus, may be regarded as examples of spasmodic contractions induced during life and continued after systematic death; at first, by simple tonicity of the structures concerned, and subsequently by the accession of true *rigor mortis*, the period of the accession being a variable one. Subsidence of muscular contraction or relaxation of the muscles is usually laid down as a necessary part of the process through which the muscular tissues pass after the occurrence of death before cadaveric rigidity sets in, and indeed is regarded as one among the other early signs of death. In the great majority of cases undoubtedly this relaxation does occur, but the cases remarked upon show that it is not a constant event—that contraction, the result of muscular tonicity, may continue notwithstanding systemic death.

As a summing up of the foregoing observations, I formulate the three following propositions:—

1. The assumption that cadaveric rigidity can occur instantaneously rests on no positive basis, and is opposed to the results of well-established observations of its nature and attendant phenomena.

2. Many observations tend to prove that a contracted condition of muscles induced by vital stimuli may, under certain circumstances, continue without alteration after the stimuli have ceased to act and after systemic death.

3. Muscles which remain thus contracted after systemic death will in due course be subjected to the advent of cadaveric rigidity in the same way as muscular tissues that have passed through the usual state of *post mortem* relaxation.

It must be admitted that there are some physiological questions involved in the phenomena that have formed the subject of these remarks, which require further and closer observation before definite and sure replies can be given to them; but if the three propositions just formulated be accepted (and there appears to be strong grounds for believing them to be correct) the chief difficulties in explaining the remarkable perpetuation of attitude and of facial expression which is occasionally met with in men who have been killed by gunshot on battle-fields will be removed.

## APPENDIX No. VI.

## REPORT ON THE MEDICAL ARRANGEMENTS FOR THE ARMY CORPS ASSEMBLED AT ALDERSHOT FOR THE AUTUMN MANŒUVRES.

By Inspector-General LAWSON, Principal Medical Officer, Aldershot.

I. General Remarks and Instructions.

THE force engaged in these operations embraced 10 regiments of Cavalry and a small number of Yeomanry, 23 of Infantry of the Line, 10 of Militia, 4 of Volunteers, 9 batteries of Artillery, 3 companies of Sappers, and 3 sections of Engineer Train, with a considerable body of Army Service Corps. These were told off into three divisions, each embracing three or four Cavalry corps, from 11 to 13 battalions of Infantry, 3 batteries of Artillery, 1 company of Sappers, a section of Engineer Train, and a body of Army Service Corps. The strength actually in the field on 16th September, including officers, non-commissioned officers, and men (but exclusive of civil police and civilians employed in transports) was in—

| | |
|---|---|
| 1st Division.... .... .... .... | 9,417 |
| 2nd Division .... .... .... | 8,795 |
| 3rd Division.... .... .... .... | 9,477 |

There were, besides, five batteries of Artillery and some companies of Engineers, embracing 1,470 of all ranks, in reserve.

Previous to leaving Aldershot, the weakly men of each corps were picked out and left behind, with a certain number for duty in the permanent camp, and in the encampments of the various regiments which were left standing while the force was absent. On the 16th September the number in camp, including sick, was 7,074 of the Line; from the difficulty in procuring some of the Militia Returns correctly, there may be some doubt regarding them, but their states showed 253; a considerable number of men, however, had been sent from some of the regiments to their depôts.

Six regiments of Infantry had been under canvas from the early part of August. The ten of Militia arrived from 21st to 23rd August, and two of Infantry, and five of Cavalry in September, all of which were encamped. On 8th September, the 2nd and 3rd Divisions marched from Aldershot, and on the 12th the 1st Division also left, and the whole force returned to this station on 21st September, when the manœuvres finished.

The Medical arrangements for this force were formed on the divisional basis, and are set forth in the following extract from Aldershot Division Orders of 31st August, 1871.

"No. V. *Autumn Manœuvres: Medical.*

"I. During the ensuing manœuvres, the following will act as Principal "Medical Officers of Divisions:—

"Staff-Surgeon Major Kendall, 1st Division.

"Surgeon-Major Sinclair, 33rd Regiment, 2nd Division.

"Surgeon-Major Clifford, 9th Lancers, 3rd Division.

"II. These officers will have the entire management of all the Medical arrange-"ments of the divisions, subject to the instructions of the General com-"manding them, or of the Inspector-General of Hospitals; and the officers "and subordinates connected with the field hospitals (except those of the "Control Department) are to be under their orders.

"III. Three field hospitals will be attached to each division, with the "necessary establishment, equipment, and transport. Each of these will be "under charge of a Medical Officer, to be named in orders for this duty. Sick "from all corps in the field, Household Troops, Militia, Yeomanry, and Volun-"teers included, will be received into these hospitals.

"IV. Each officer designated for the charge of a field hospital will indent "on the Controller for the equipment and transport, and on the Apothecary "to the forces for the medical stores, as indicated in lists* prepared for this "purpose, which will be communicated to him by the Principal Medical "Officer of the Division. The medical officer in charge of the hospital will be "responsible for these stores until returned to the Control Department, and "Apothecary respectively, on the termination of the service. Any loss or "damage caused by the troops, other than fair wear and tear, will be assessed "by the proper officer, and charged to them in the usual manner.

"V. One Regimental Medical Officer is to accompany each regiment of "Cavalry, battalion of Infantry, and battery of Artillery. He will take with "him a medical field companion, to be carried by an hospital orderly belonging "to the corps, except in the case of the Artillery, in which it will be carried in "the store cart. Each corps will take a field stretcher, to be carried in the "baggage wagon.

"VI. The Principal Medical Officer of the division will indent on the "Controller for 20 ambulance wagons, for the general service of the division. "These will be told off to the various services as he may direct.

"VII. The men treated in the field hospitals will be on field rations, for "which the regulated stoppage will be charged. Such of them as receive "medical comforts will be subject to the additional stoppage for each day on "which these are issued.

Just before the 2nd and 3rd Divisions started, the latter part of par. 5 of the above order was cancelled in Army Corps Orders of 7th September, and the following substituted:—

"No. III. *Autumnal Manœuvres: Medical.*

"During the autumnal manœuvres, one hospital orderly per regiment will "carry a medical field companion, and one man the field stretcher, so that it "may accompany the column, instead of being placed in the regimental baggage "wagon, as directed in par. 5 of Divisional Order No. V. of the 31st ultimo. "The packs of these men are to be carried in the regimental baggage "wagon."

An officer of the Control Department, of the rank of Deputy Commissary, was subsequently nominated to attend to the hospital supplies of each division.

A serjeant of the Army Hospital Corps was attached to each Principal Medical Officer of a division as clerk, and a private of the same corps as orderly.

Each field hospital had a staff-surgeon in charge, and responsible for the stores, two staff assistant-surgeons, two serjeants Army Hospital Corps (one of these a compounder), and six orderlies of the Medical Branch of the Army Hospital Corps, and a serjeant and private of the Purveyor's Branch as steward and cook. Each hospital was provided with 45 sets of bedding, with the requisite tentage and stores and a water-cart. The tentage and stores were carried in two general service wagons, in which sufficient space remained for the transport of the officers' tents and baggage, and the men's knapsacks.

The following instructions were printed, and a copy sent to each officer concerned. Copies also were transmitted to the Assistant Adjutant-General and Assistant Quartermaster-General of Divisions, and Brigade Majors, for reference:—

"*Aldershot, September* 2, 1871.

"Instructions for Medical Officers on Flying Columns during the "Autumn Manœuvres.

"No. I. Regimental Medical Officers.

"1. They will retain slight cases of sickness that are likely to be well in "a few days, and which can be treated in their tents, on field rations, "and with the medicine contained in the field companions.

* *See* Appendix.

"2. Men likely to be unfit for duty for a longer period are to be sent to the "field hospitals.

"3. As numbers of men may have their feet blistered from marching, "Medical Officers are to apply to their Commanding Officers to have "every man suffering in this manner taken, at evening parade, to the "Medical Officer, who should cause him to wash his feet, and then to "pass a needle with a worsted thread through each blister, cutting off "the thread a little distance outside the blister at each side, and leaving "a portion in it. The part is then to be rubbed with common soap, the "sock put on, and wetted over all prominent points, and the soap again "rubbed over them freely. When properly attended to, no man should "be unable to march the following day on account of blistered feet, unless "the cuticle has actually been removed, leaving a raw surface exposed.

"4. Morning states on W. O. Form, 986, are to be sent to the Principal "Medical Officer of the division daily, and in the column of remarks in "the form on the second page, men sent to the field hospitals must be "indicated, with the date.

"5. When men are sent to the field hospitals a nominal list must accom- "pany them on the following form. Medical certificates must also be "sent with such men.

"RETURN of Men of Regiment (or Battery, &c.) sent to the field "hospital this day Camp at September, 1871.

| Regiment, &c. | Regtl. Number. | Rank and Names. | Disease. | Date of Transfer. | Whether Rationed on day of Transfer. | To be left vacant for Remarks of Surgeon of Field Hospital. |
|---|---|---|---|---|---|---|
| | | | | | | |

"6. Weekly sick returns on W. O. Form, 294, must be transmitted in "duplicate every Saturday morning to the Principal Medical Officer of "the Division. Men discharged to the field hospitals must appear in "these, as transferred to other hospitals.

"7. An admisssion and discharge book in the usual form must be kept for "each corps, in which all cases of sickness are to be entered, whether "retained with the regiment, or tranferred to the field hospitals.

"8. The Medical Officer will also keep a diary and letter book. These may "be in the same volume.

"9. The instructions in the Medical Regulations, bearing on field or other "duties, are to be strictly carried out."

"*Aldershot, September* 2, 1871.

"Instructions for Medical Officers on Flying Columns during the "Autumn Manœuvres.

"No. II. Medical Officers in charge of Field Hospitals.

"1. Medical Officers named in orders to take charge of field hospitals will "indent on the Controller for the equipment and transport, and on the "Apothecary to the forces, for the medical stores, according to the "annexed lists. These indents are to be countersigned by the Prin- "cipal Medical Officer of the Division. The Medical Officer is respon- "sible for these stores until returned to the Control Department, or "Apothecary, respectively. Any loss or damage, other than by fair "wear and tear, will be assessed by the proper officer, and charged in "the usual manner.

"2. The officers and servants attached to each field hospital (with the "exception of those belonging to the Control Department) are under the "immediate orders of the Medical Officer; but the Principal Medical "Officer of the division may dispose of the establishment, or detach any

" portion of the equipment to meet the requirements of the Service. In " the latter case receipts should be passed for the stores handed over.

" 3. The field hospital of each division will be distributed according to " instructions of the Principal Medical Officer of the Division. When " open they will receive sick from all branches of the Service, including " Household Troops, Foot Guards, Militia, Yeomanry, and Volunteers.

" 4. An admission and discharge book of the General Hospital form is to be " kept in each field hospital. This is to embrace the names of all men " dieted in the hospital, with the date of their leaving it, and their " destination.

" 5. Men sent from regiments or corps are to be accompanied by a nominal " list, giving their regimental numbers, diseases, and showing whether " they have been rationed for the day or not. Medical certificates also " must be sent with them. The Medical Officer in charge must " examine these men, and satisfy himself as to the diagnosis of the " regimental officers. He is then to select such as are likely to recover " in a few days, or are not fit to be removed, for treatment in the field " hospital. He will retain the medical certificates of these men, and, " after marking them as 'admitted,' on the nominal lists sent from their " regiments, will transmit these lists, with the medical certificates of " the remaining men, with a recommendation for their removal else- " where, to the Principal Medical Officer of the Division. In case of " men who have been under treatment in the field hospitals requiring " to be sent to Aldershot, similar nominal lists, distinguishing the " regiments, are to be transmitted by the officer in charge of the hospital to " the Principal Medical Officer, accompanied by their medical certificates. " The names, &c., of men recommended for removal to Aldershot, or " elsewhere, are to be communicated to the steward, that he may, on " the Principal Medical Officer's sanction for their removal being given, " acquaint their regiments with their departure from camp.

" 6. A medical case-book, ward-book, diary, and letter-book, are also to be " kept with each field hospital. Orders issued by the Principal Medical " Officer of the division, or in division orders, affecting the medical " arrangements are to be inserted in the letter book.

" 7. Morning states, on W. O. Form 985, are to be sent by each officer " in charge of a field hospital to the Principal Medical Officer of the " Division, merely showing the numbers of sick in the return of diseases, " but giving the names, regiments, &c., of those admitted, died, or " discharged, with the destination of the latter in each case. Sepa- " rate states will be required for the troops of the Line, including " Household Troops and Foot Guards, the Militia and Yeomanry, and " the Volunteers.

" 8. The Medical Officer in charge of each field hospital must also send to " the Principal Medical Officer of the Division, a weekly sick return, on " W. O. Form 294, in duplicate. In this, men discharged to Aldershot " or elsewhere, must be shown in the column "Transferred to other " hospitals." Separate returns must be sent for the different branches " of the force, as in paragraph 7.

" 9. The sick are to be on field rations, which will be cooked as the Medical " Officer in charge may direct, following the instructions in the Medical " Regulations. The rations are to be supplemented, when necessary, by " such extras as the nature of the case may demand.

" 10. The usual diet sheets to be kept for each man in hospital, on which " extras ordered must be entered and initialed by the prescribing " Medical Officer in the usual manner.

" 11. Extras can be obtained from the steward on requisition as usual.

" 12. When men are transferred from the field hospitals to Aldershot or " elsewhere, they are to have their breakfast before leaving. Bread is " in such cases to be issued in lieu of potatoes, and the meat for dinner " is to be cooked. Their tea and sugar for the evening meal should be " taken with them.

" 13. The instructions in the Medical Regulations bearing on field and " other duties are to be carried out."

"*Aldershot, September* 2, 1871.

"Instructions for Medical Officers on Flying Columns during the "Autumn Manœuvres.

"No. III. The Principal Medical Officer of the Division.

"1. He has the entire management of all the medical arrangements of the "division, subject to the instructions of the General in command of it, "or the Inspector-General of Hospitals: and the officers and subor- "dinates connected with the field hospitals, except the stewards and "cooks of the Control Department, are to be under his orders.

"2. When the division is concentrated he will cause one or more field "hospitals to be established according to the requirements of the sick. "When a portion of the division is detached one of the hospitals may "accompany it. If necessary, one hospital, or a portion only, may be "left at any point, if there be sick who cannot be removed. In the "latter case receipts should be passed between the officer left in charge "and the Medical Officer in charge of the hospital, for the stores handed "over.

"3. He will dispose of the ambulance wagons so as to meet the require- "ments of the troops on the line of march, retaining such as may be "necessary for the transport of sick to Aldershot, or other points, as "may be ordered.

"4. He will obtain morning states of sick from the different corps, and "field hospitals of the division, as directed in the instructions for the "officers in charge of these respectively.

"5. He will also obtain weekly sick returns on W. O. Form 294, in dupli- "cate, in which the instructions to the Regimental Officers, and those "in charge of field hospitals, are to be observed, and the established "nomenclature strictly followed.

"6. He will exercise a supervision over the sanitary arrangements of the "division, as indicated in Sec. XXI. of the Medical Regulations.

"7. On receiving the nominal lists of men recommended for removal to "Aldershot, or elsewhere, if he approves of their proceeding, he will "cause their regiment, regimental numbers, names, and diseases to be "entered in an admission and discharge book of the general hospital "form, with the dates of their proceeding, their destination, and where "they were rationed on the day they left.

"8. A nominal list of the men of each regiment, embracing the same facts, "and accompanied by their medical certificates, must be handed to the "officer or non-commissioned officer who proceeds in charge of the men, "to be delivered to the officer into whose charge they are ultimately "consigned.

"9. When there are only a few men, whose cases are not severe, it may be "sufficient to send them under charge of a serjeant of the Army Hospital "Corps; but when they exceed two ambulance wagon loads, or with any "smaller number, if there be any serious cases among them, a Medical "Officer should accompany them, provided with the necessary means "to meet any probable contingency on the journey.

"10. A supply of each of the articles included in the field companions will "be given to the officer in charge of each of the field hospitals, from "which the stocks of the regimental officers may be replenished on the "order of the Principal Medical Officer. Should further supplies, either "for these or the field panniers of the hospitals, be required, timely "requisitions, countersigned by the Principal Medical Officer, should "be made on the apothecary at Aldershot for them.

"11. The Principal Medical Officer is to keep a diary and letter book, and "an order book. The former should contain notices of the movements "of the division, and of the various sanitary or other matters that may "arise, and all communications to other departments. The latter to "embrace all orders or memoranda he may find it necessary to issue to "his subordinates. All orders which may affect other departments, "though originating with the Principal Medical Officer, should be "inserted in division orders. The Principal Medical Officer to com-

"municate all orders issued by him, or affecting the Medical Depart-
"ment, to the Inspector-General of Hospitals.
"12. He will give effect to any of the provisions of the Medical Regulations
"that may bear on the circumstances that may arise.

II. Strength and Sickness in the Field.

The field states of the Adjutant-General for the 16th September, which is very nearly the middle period of the manœuvres, and which may therefore be taken as a very close approximation to the mean strength for the period, show 20,420 non-commissioned officers and men of the Line, and 5,358 of the Militia, besides a body of about 1,900 Volunteers. Of the two former, the following were the numbers admitted on the sick list, and how they were disposed of:—

| | Admitted. | Discharged to duty. | Transferred to other Hospitals. |
|---|---|---|---|
| Troops of the Line .. .. | 287 | 67 | 220 |
| Militia . .. .. .. | 97 | 50 | 47 |

These, reduced to the form of annual milesimal ratios, are—

| | Admitted. | Discharged to duty. | Transferred to other Hospitals. |
|---|---|---|---|
| Troops of the Line .. .. | 365 | 85 | 280 |
| Militia . .. .. .. | 471 | 243 | 228 |

No death occurred in the field, either from disease or accident, and of those transferred to Aldershot only one case proved fatal during the period, that of an artilleryman sent in, supposed to be labouring under pneumonia, but in whom there was extensive hypertrophy of the heart.

There was a very moderate number of admissions from rheumatism, affections of the lungs, or bowel complaints; though, with the exception of the first two days the weather was dry, yet the nights were cold, but no doubt the comparative immunity from these diseases was owing in no small degree to weakly men having been left behind, and the dry weather during the field operations.

There were no doubt a considerable number of men who applied to the Regimental Medical Officers with bowel complaints, besides those shown in the returns, but these were slight, and a dose or two of medicine was sufficient to meet them without removing the individuals from their duty. There had been a great deal of slight diarrhœa in the end of August and beginning of September, especially in the North Camp and some of the regiments under canvas on Cove Common, but it had decreased perceptibly before the troops marched, and went on diminishing thereafter.

The instructions for the management of blistered feet were very successful, as, notwithstanding the long marches the men made, the numbers incapacitated for duty from this cause amounted to about 1 per 1,000 of strength, both in the Line and Militia, and the greater part of these were able to return to duty without leaving the field.

The very small number of sick afforded no opportunity of testing the working of the field hospital system; unless when the brigades of a division were much detached, it was not necessary to open all the field hospitals, or, indeed, seldom the three marquees of one, so that no strain was brought upon them at any time. The period they were out was too short to have got them fairly into working order under any circumstances, but the remarkable healthiness of the column afforded them little opportunity.

After the field hospitals were provided with attendants from the Medical Branch of the Army Hospital Corps, there remained two non-commissioned officers, and 20 privates, under the command of the Adjutant of the corps, and accompanied by Staff Assistant-Surgeon Moffitt, who had instructed these in the method of assisting and removing wounded from the field. This party, with a light service wagon for the carriage of their camp equipage and baggage, and the necessary field appliances, was attached to the 3rd Division, which it joined at Woolmer on 13th September. Instructions had been sent to the General Commanding the Division to afford any assistance the Principal Medical Officer might deem advisable by allowing, for the sake of experiment, a few men to fall out on field days, who should remain on the ground as wounded to be picked up and removed, as would be the case in actual service. The party was unfortunately too small to undertake this duty for more than one or two regiments at most, while the novelty of the manœuvres, and the exhilaration and excitement they caused among the troops, afforded no scope for their practising the removal of disabled persons during their advance. On two occasions a body of men was told off as wounded, and removed to the rear. The following extracts from the diary of Staff Assistant-Surgeon Moffitt will afford the necessary details of the operation.

"*September 14th.*—At five o'clock a company of the 102nd Regiment was paraded 200 yards distant from the hospital. The bearer detachment, with six stretchers, three men to each, proceeded to remove them as if wounded. Each bearer carried the following articles in his haversack, viz. :—Triangular bandages, 3; lint, 6 pieces; pins, 6; and No. 2 of each stretcher party carried in addition to the above, a tourniquet and a pair of strong scissors. Two of the stretchers employed had each, one set of field splints. The six stretcher parties dressed and applied splints to the fractured limbs, and removed to a distance of 200 yards 18 men supposed to be suffering from the following wounds, which were indicated by attaching a ticket to each man as he fell out :—

"*Wounds of forehead, 2; side of head, 2; top of head, 2; left side of chest, 1; front of belly, 1; flesh wound of thigh, 1; wound and fracture of thigh, 2; wound and fracture of leg, 1; wound of hand, 1; wound and fracture of fore arm, 1; wound and fracture of arm, 1; wound of foot, 2; flesh wound of leg, 1.*

"The time occupied in removing, &c., the above men was 20 minutes. The arms, knapsacks, and accoutrements of these men were removed with them. Nos. 1 and 2 bearers carried the stretcher, while No. 3 bearer carried these articles.

"*September 19th.*—In the afternoon, the Principal Medical Officer had a company of Militia strewed about the ground, 200 yards distant from the hospital. A bearer party of six stretchers proceeded to pick them up, dress their wounds, which were indicated by tickets, and carry them to the hospital. The time occupied in removing 25 men was 33 minutes, a distance of 200 yards, over very rough ground.

"At starting, it was thought it could be managed to have a certain number fall out, as if wounded during the engagements. This, however, was found to be difficult to manage, and the idea was given up."

III. Remarks on various points arising during the Operations.

The following remarks on various points that arose during the manœuvres are mostly based on the observations of the Principal Medical Officers of divisions and the Surgeons in charge of field hospitals :—

*Rations.*

The quantity of bread constituting the ration in the field was 1½ lbs. There was a very general impression this was too much, and in proof it was stated that, on removing from an encamping ground a considerable quantity was always seen lying about. I have met with no one who attempted to form an estimate of the quantity of bread so left, though in the absence of a tolerable approximation it is clear no trustworthy opinion can be formed. The allowance of bread in barracks is, including that of the grocery ration, 1¼ lbs. and no complaint is made of its being in excess, though the men have potatoes and vegetables in their messing, regularly, as well. During the late operations potatoes were generally available, but if on any occasion these had been

wanting, then the men would have had nothing to fall back on except their bread. As there were 15 men in a tent, the allowance in excess of that issued in barracks at this station would be 3¾ lbs. daily, or 2½ loaves of 1½ lbs. each, and to establish the opinion that the quantity per man was too much (even supposing that everyone of the fifteen had eaten his full barrack allowance) from two to three loaves per tent, at least, should have remained on striking the camp. I have not been able to find that anything approaching this was met with. There will always be individuals among a large body of men who consume less food than the generality of those around them, but it would be unsafe to regulate the supplies for the whole by the consumption of the exceptional men.

Biscuit was issued on some occasions, and, as usual, the men would have preferred soft bread. There is no doubt that when the latter can be made available, it is a better form than the former in which to present so important a portion of the daily food, but there are many occasions in which soft bread cannot be prepared, when biscuit will prove of great value.

Several of the Medical Officers, while they recommended a diminution of the quantity of bread, advised an increase of the ration of meat to 1 lb., from ¾ lb., and in one case to 1 lb. without bone, or about 1¼ lbs. including that. From the short period the field operations lasted, I do not think that any serious result followed the issue of the ¾-lb. ration, more especially as regiments had canteen carts, which enabled the men to supply themselves with bacon and other kinds of food they fancied; but if the operations had been of longer continuance, or had the men not been able to obtain such extra articles as they fancied, an increase to 1 lb. would have been advisable.

Australian meat was issued on several occasions, and the general opinion seems to have been that when eaten cold it was very good. No doubt as the men become familiar with the various methods in which it may be prepared, this article will become more appreciated.

Sausages were issued on one or two occasions. These were not generally relished. Some officers suggest that a little more seasoning would have been an improvement, others that they should be issued in small quantity as an addition to the ordinary ration, others that they should be retained for emergencies. Considering the taste of these men, I fear sausage is not likely to be relished generally, and will prove acceptable only under circumstances when fresh or salt meat cannot be procured.

Soup and bouille was issued once, or twice, and caused very great dissatisfaction from the large amount of vegetables it contained, and the deficiency of meat. Something also depended on the men not understanding how to prepare it. Some, who had acquired this knowledge on board ship, were much better satisfied than the majority who had not.

Salt meat may be used at times, and an occasional issue affords an agreeable change to most men, and, unless under particular circumstances, can be had recourse to without injury.

Some Medical Officers recommend the addition of cheese to the field ration. Cheese, at one time, formed a part of the naval ration, but there was such difficulty in preserving it that its use was abandoned, and it has not now been employed for many years. The difficulty experienced on board of ship would be increased with an army, and I fear the idea of employing cheese in the field abandoned.

### *Hospital Equipment.*

*Marquees.*—Some officers complained of the weight and difficulty of erecting and striking the hospital marquee, and recommended something smaller and lighter. Could it be accomplished this no doubt would be a great advantage, but the task is far more difficult than is generally imagined.

The marquee is a particularly roomy, dry, and comfortable tent; its rounded ends permit of its being equally well supported there as at the sides, and give it great stability.

A marquee for hospital purposes, after the American pattern, was tried at Aldershot; this was 14 feet by 15 feet, with square ends, and walls 5 feet high. It had two poles and ridge pole, and single fly, but with a light blue

calico curtain inside the roof. Its weight was 246 lbs., or about exactly half that of the regulation marquee. It was found to be much less stable than the regulation pattern during windy weather, the large flat gable end having no support unless guys from the top of the end pole, while the circular end had the advantage of that from the tent lines from the eaves all round. In addition, in stormy weather, so much rain came through the single walls, as to lie in pools in the hollows of a waterproof bottom placed inside.

Some of the officers who had served in India recommended a tent resembling the Sepoy pal for field hospitals. This seems to be a square tent of 15 feet by 16 feet, with single fly and with bamboo poles, weighs 120 lbs. Those supplied to the Abyssinian Expedition were 176 lbs. A somewhat similar tent has recently been sent to this from Woolwich, called the Whinyate tent; this is 15½ feet long by 13 feet wide, with square ends, walls 1½ feet high, and two poles 9 feet 6 inches long, with ridge pole, and single throughout. Its weight, complete, is 160 lbs. This tent has nearly the same area as the American marquee, and, like it, the disadvantage of square ends, but the area of the end is one-third less than that of the American tent, and being altogether lower will be much less affected by the wind. Being single throughout, its roof and sides, like the American, will admit a considerable amount of water when the weather is boisterous. Besides these there are the circular linen and calico tents, the former of which has an area of 133 feet, with a cubic content of 510 feet, and when complete weighs 79 lbs.; the latter has an area of 138 feet, with a cubic content of 656 feet, and weighs 72 lbs. complete. Allowing the same floor space in each of these, as in the hospital marquee with 18 men, the numbers they would accommodate with the cubic space for each, and weight to carry per man would be—

| Tent. | Number of Men. | Per Man. | | |
|---|---|---|---|---|
| | | Superficial Area. | Cubic Space. | Weight to Carry. |
| | | Feet. | Feet. | lbs. |
| Hospital Marquee .. .. | 18 | 18·2 | 146 | 29·5* |
| Whinyate Square Tent .. | 10 | 19·8 | 110 | 16·0 |
| Cotton Circular Tent.. .. | 7 | 19·7 | 94 | 10·3 |
| Linen „ „ .. .. | 7 | 19·0 | 73 | 11·3 |

This Table, calculated on the superficial area available for each man, shows a considerable saving of weight, but with a great reduction of cubic space in the last three; but if the cubic space be taken as the regulating condition, these are greatly modified as under:—

| Tent. | Number of Men. | Per Man. | | |
|---|---|---|---|---|
| | | Superficial Area. | Cubic Space. | Weight to Carry. |
| | | Feet. | Feet. | lbs. |
| Hospital Marquee .. .. | 18 | 18·2 | 146 | 29·5* |
| „ Tent.. .. .. | 8 | 24·8 | 138 | 20·0 |
| Cotton Circular Tent.. .. | 5 | 27·6 | 131 | 14·4 |
| Linen „ „ .. .. | 4 | 33·2 | 128 | 19·8 |

With these numbers the cubic space is nearly the same as in the marquees, and the weights are less; but with this must be accepted the fact of their

* This is without the waterproof floor-cloth, which would increase the weight 10 lbs 6 ozs. per man for the full number, or 191 lbs. for the marquee. The others are without waterproof floor-cloths.

being single, and permitting much more water to pass through in boisterous weather than the marquee. Their utility for the treatment of men really sick is much less. For simple shelter in dry weather the Whinyate tent, with a little increase to its ventilation at the ridge, might afford some of those facilities desired by several Medical Officers, and suit slight cases well enough, but for cases at all serious, and in wet weather, it would prove very inferior to the regulation marquee. In future operations, in place of sending three marquees to each field hospital, as on this occasion, it might be well to substitute two Whinyate tents for one of the marquees, which would admit of their being tried.

It was originally recommended that each regiment should have a bell tent for the segregation and treatment of slight cases, and to enable the Medical Officer to make those examinations which he can scarcely do exposed to public view. This was not carried out, and the deficiency was generally remarked on, and a strong desire expressed that on future occasions this want should be supplied. It is clear that many examinations a Medical Officer has to make should not be done where the parties are exposed to public view, and others cannot be made efficiently in the open air in wet or cold weather; it is therefore advisable on future occasions a tent should be at the disposal of the Medical Officer for these purposes.

Some of the Medical Officers recommended a tent to be attached to the hospital for the special use of cases of diarrhœa, as well as a latrine screen for other cases. It appears to me that in this country one or other is sufficient, but both are not required; and unless the weather be wet the screen is preferable to the tent.

There was frequently much difficulty in finding the situation of the hospitals. This might be indicated by the Geneva flag during the day, and a red light at night. A red cross on a white ground painted on the roof of each hospital marquee would serve the same purpose during the day, were these strictly confined to hospital purposes; but as many were used for other services the cross on the roof would have increased the confusion. The hospital canteens of the new pattern contain a lantern with a red glass, which could have served this purpose at night, but those available for the column were of the old pattern, which have simply a common lantern.

Some pairs of steel experimental canteens were in use, from June to early in September, for cooking for the hospitals of 82nd, 100th, and 102nd Regiments, at Rushmoor, and subsequently with the divisions in the field. They were found very convenient, did their work satisfactorily, and so far have stood the wear and tear well.

There were several complaints of the uselessness of the hand-saws supplied for cutting wood, and some Medical Officers recommended cross-cut saws instead. A small cross-cut saw might be supplied in place of the hand-saw, but its full advantages could not be obtained unless some sort of stand were made for the billet of wood to be cut being placed on. Complaints were also made of the unsuitability of the felling axis for splitting wood, and other forms recommended; it strikes me, however, that if the subject were reconsidered the conclusion might be modified.

The number of reaping-hooks supplied were said to be unnecessary, but the circumstances requiring their employment do not seem to have arisen. These are useful in clearing the ground for the marquees of small brushwood, or long grass, and for cutting grass, rushes, fern, or fine heath, for stuffing the paillasses. The number of hooks was six per marquee, and if the surface were covered with a considerable growth it would be found, to clear it properly, and a sufficient space around, all would be fully occupied for half-an-hour or more before the tents could be erected. A smaller number would of course require a proportionately longer period, and as they are not weighty articles, and some may get broken or lost, it does not seem advisable to reduce the number.

*Filters.*—Several of the Medical Officers recommend the employment of filters, one to accompany each water-cart; and Staff-Surgeon Watson says he has a plan for a filtering case, which can be fitted to the funnel for filling the cask, or removed, as occasion requires. Could something of this nature be made that would occupy little space, not be easily damaged, and be effective, it would prove useful on many occasions.

The Principal Medical Officers of Divisions, and the Surgeons in charge of hospitals, all represent the necessity of their having a table and seats in their office tents. A light table and two camp stools are certainly advisable where there must be frequent writing required.

*Medical Stores.*

Each field hospital was provided with a pair of field panniers, carried on a pack horse, and a Medical field companion was added. The Surgeon carried his capital instruments, and each Assistant-Surgeon had his pocket case.

Some Medical Officers recommended that a duplicate set of capital instruments should be provided in case a portion of the hospital being detached, and that a second field companion should be available. On actual service the instruments no doubt should be supplied, and the second field companion would render the Medical Officers more independent, as, whenever detached, they could carry one of these with them. During the recent operations, however, the number supplied proved fully equal to all the requirements.

Notice was received that six sets of new experimental wallets were dispatched from the Horse Guards for trial during the manœuvres. These, however, were not available here until after the field operations had finished.

Each Regimental Medical Officer had his pocket instruments and a Medical field companion with him. It appears to me it would be well on future occasions that each should also carry a stethoscope.

*Ambulance Wagons.*

Twenty ambulance wagons were supplied to each division, and the instructions were that these should be completely under the orders of the Principal Medical Officer of the division, who was to tell them off to the various duties as he found it necessary, the object being that their services should be made available for the division generally, instead of being partially neutralized by being told off to duties which afforded them occasional and insufficient occupation. There were many difficulties, however, in the way of this being carried out, and the operations did not last long enough to permit of these being met and overcome.

It was thought advisable to attach one ambulance to each regiment on the line of march, to pick up men who fell out; and at first it was directed that these should return to one point after the troops reached their camping ground, and, on the following day, return to their respective regiments to accompany them again. The drivers, being men of the Army Service Corps, removed their horses at the end of the march to the encampment of their troop, and the following morning returned to the wagons, and took these to the various corps as directed, but sometimes they were unable to reach the regiments they were appointed to in time to march off with them. This soon led to the wagons being left with the various regiments, and the drivers proceeding direct to these from their troop encampment, when required for moving, to the abandonment, in fact, of the divisional arrangement for a regimental one. There being from 14 to 17 battalions or corps in each division, there were from three to five wagons remaining for the carriage of the sick of the field hospitals from one encamping ground to another, and for the transport of these to the nearest railway stations or fixed hospitals in the rear; these would have proved quite insufficient had only the ordinary number of admissions taken place.

Another point requiring arrangement was that the wagons, having been issued by the Control Department on the requisition of a Principal Medical Officer of the division, the drivers did not consider themselves responsible for them or their fittings, while the Medical Officer had no one of his own department to entrust the care of these to; it is clear this system could not work for any length of time, the wagons would be getting out of order, their fittings lost or destroyed, and defects would never be found out until it was too late to remedy them.

To meet these various difficulties it is necessary that both wagons and horses should be under one authority, and that the delegate of that authority

should accompany them, and be responsible for all their details wherever they go. To ensure the greatest efficiency it would be well to place these under the Medical Department, as in the Prussian Service, but as at present the organization of the Medical Branch of the Army Hospital Corps is not adapted for the purpose. Until that be altered I see no alternative but to leave both wagons and horses under the officer in charge of the transport corps, and have his men responsible for the wagons and their fittings, as well as the horses. These should be kept complete and ready for service on the shortest notice, and altogether at the disposal of the Principal Medical Officer of the division, so that they may be employed in any direction the exigencies of the Service and sick may require.

In future operations, especially if these be carried on at a distance from Aldershot, it will be necessary to increase the number of wagons considerably. Supposing the division to average 15 or 16 corps, and to have a strength of from 9,000 to 10,000 men, one wagon will require to accompany each battalion on the line of march, and if there be few halting days, so as to prevent their being available for other purposes, at least 14 more for the field hospitals, or 30 per division, would be required to meet all contingencies. This, after all, would provide carriage for 240 men, or but 2½ per cent. on a strength of 9,600. The numbers told off to battalions will seldom be fully occupied, but I do not see how they could be materially reduced until the Service be thoroughly organized on the divisional basis, so as to do away with the necessity of telling them off to single corps.

In the early part of the manœuvres there was a considerable disposition manifested to convert ambulance wagons into store carts. Having fallen in with a very striking instance of this, besides others less prominent, I brought the subject under the notice of the Adjutant-General, and the following Order was issued with reference to this point:—

"*No.* 1 *Instructions.*

"3. It is to be distinctly understood that ambulance wagons are not to be "made use of for the transport of baggage or articles of equipment other "than the arms and equipment of the soldiers carried in them. Officers "commanding regiments to which these wagons are temporarily "attached, will warn those under their orders to observe this rule."

The system of attaching ambulance wagons to regiments led to these following the corps during the day wherever they went, and as the troops frequently moved over ground broken and cut into deep ruts, the wagons were tossed about to a corresponding extent. It was this which led some Medical Officers to remark on the roughness of their motion; but no carriage could have gone over the same ground without excessive shaking and jolting. For the same reason, too, the wagons were frequently seen close behind the corps they were attached to when in action, where on actual service the men and horses would have incurred great risk, and been able to render little service. These points could only be met by a different organization of the Service.

The water casks attached to the wagons were not all originally fitted with taps, and several that were supplied here had them put in to a slight extent only, and had no strap over the free end of the tap to keep it from shaking out. After a day or two several were reported to have fallen out, and had to be replaced. These taps were fixed less securely than they might have been, to allow of their projecting sufficiently over a bar on the fore-carriage of the wagon (constituting one of the supports of the barrels), to run into a vessel placed beneath to catch the water.

*Officers and Men.*

When brigades were encamped separately considerable difficulty was experienced by the Principal Medical Officers of divisions in carrying out the details, and they had in several instances to direct the Surgeons of the field hospitals to superintend the details for the brigades they were doing duty with for the time being. Unless the hospitals were permanently attached to particular brigades, this could not be done continuously, and even if they were

the hospitals could not be so readily disposed of for the requirements of the Service, as if left entirely at the discretion of the Principal Medical Officer. These difficulties might have been diminished, so far as the junior officers were concerned, had the operations been continued sufficiently long to have enabled them to become familiar with the routine of duties, but this can scarcely be expected to be the case in future manœuvres.

During the late operations it was necessary to attach the men of Army Service Corps and other details to the field hospitals for Medical attendance. This led to no inconvenience, as the Medical Officers attached to the hospitals had very little to do, and had consequently sufficient time to meet the various calls upon them; but had there been more sick, and had the Medical Officers been frequently employed in accompanying them to the fixed hospitals in the rear, much inconvenience would have arisen. As the Army Service Corps, with hired transport, were upwards of 500 in each division, a Medical Officer in future would require to be told off for them alone, and it is desirable two or three others per division should be available to take the places of others who may become inefficient from any cause.

It was strongly recommended that the Medical Officers, who were not allowed forage, should have had horses allowed them during the late manœuvres; but the proposition was submitted too late. In future, however, it is very advisable this should be complied with.

There was great variety of opinion among Medical Officers as to the number of Army Hospital Corps necessary. One would have two attached to each ambulance wagon. Another would have them in sufficient numbers to afford fatigues and guards for the hospital; another would have the Medical Officers supplied with servants from the corps. There is but little probability of these views being entertained at present, so it is unnecessary to remark on them. While ambulance wagons are following corps on the line of march we must trust to the Regimental Medical Officer being able to secure sufficient assistance from his corps to place any serious case in them, and when employed in transferring sick to the rear they would of course be accompanied by one or more Army Hospital Corps men, under an officer or non-commissioned officer, as circumstances might require.

Staff Assistant-Surgeon Moffatt remarks that the swords supplied to the men of Army Hospital Corps were found extremely inconvenient when they were occupied in picking up and removing wounded.

With regiments each Medical Officer was directed to take with him one of the trained hospital orderlies. I think it would be well if a steady corporal, were authorized to be employed with each corps in the field, in addition to the orderly, and, as recommended above, that a bell-tent should be made available for the Medical Officer to examine cases in and to separate a few which are not so seriously unwell as to require to be sent to the field hospitals.

*Rations.*

The sick were on field rations, and as the returns for these were generally made out the day before they were issued, men admitted to the field hospitals had to receive their rations from their regiments the day of admission. Some corps sent them to the hospitals, but others were less regular in this respect, and considerable delay and inconvenience was experienced in procuring them. On future occasions it would be better to have this point so arranged that the hospital steward should obtain rations for every man in hospital direct from the issuer, without having to send to his corps at all.

In the same manner, when men were dispatched from the columns in the field to Aldershot, at an early hour in the morning, and before rations were issued, they were returned as being rationed, though actually they had received a portion only, or perhaps none at all. It is requisite this should be so arranged in future that the ration could be drawn for the men wherever in the course of service they may be sent.

"DUTIES OF THE STEWARD IN CHARGE OF HOSPITAL CONTROL SUPPLIES IN EACH FIELD HOSPITAL ON FLYING COLUMN IN SEPTEMBER.

Issued by Deputy Controller.

"1. He will, under the Brigade Control Officer, have charge of, and be responsible for, the supplies of medical comforts.

"2. He will superintend the non-commissioned officers and men (Supply Branch), Army Hospital Corps, reporting any irregularity to the above-named officer.

"3. On the establishment of a field hospital he will draw from the ward master such utensils (in the A and B canteens) as are necessary for the store and for cooking purposes, returning them on the termination of the manœuvres.

"4. He will be responsible that there is at all times a reasonable supply of medical comforts in store. Timely requisitions for fresh supplies to be sent to the Brigade Control Officer for transmission to Aldershot, from which it is anticipated there will be frequent opportunities of obtaining such supplies.

"5. Every man and boy admitted to hospital will be upon field rations, supplemented by medical comforts, at the discretion of the Medical Officer in charge, subject to a stoppage of 5½*d.* a-day when receiving extras. The number of such rations will be shown in a separate column of the Regimental Field Ration Return, to enable the supply officer of the brigade to forward in bulk the rations of the sick of the several regiments composing the brigade to the field hospital. These rations will be sent from the Control Supply Depôt not later than seven o'clock each morning.

"The following articles compose the daily field ration:—1½ lb. of bread, ¾ lb. of meat, ⅛ oz. of tea, ⅛ oz. of coffee, 2 ozs. of sugar, ½ oz. of salt, and $\frac{1}{36}$ oz. of pepper.

"6. The steward will be held responsible that due notice is given to each regiment of men who are to be sent to Aldershot for treatment, to prevent rations being drawn for men who have left the camp.

"7. Whenever sick are sent to Aldershot the steward will take the instructions of the Medical Officer in charge, as to what rations and medical comforts he considers it necessary should accompany them, and obtain his receipt for the issue. The same course to be adopted should any portion of the hospital be detached.

"8. He will carry out the instructions of the Medical Officer in charge as to the manner the supplies are to be cooked, and the hours such supplies are to be prepared for the patients.

"9. *Wood for Cooking.*—Wood will be issued at the place of encampment at the rate of 5 lbs. per patient and hospital servant per diem, beyond this the certificate of the Medical Officers in charge will be required, that such extra issue is absolutely necessary.

"10. Medical comforts (as below) will be placed in the field panniers of of each brigade, for use of any sick on the line of march, to be replenished on requisition from the Medical Officer in charge.

"On a pack-horse; No. 1 pannier: 1 bottle of brandy, 1 bottle of water. No. 2 pannier: 1 lb. of tea, 2 lbs. of sugar, 1 lb. of arrowroot, 1 lb. of essence of beef, 1 tin of cocoa and milk."

STATEMENT of Medical Comfort Boxes, and A and B Hospital Canteens, accompanying each Field Hospital.

Medical Comfort Boxes, No. 1 and 2 Divisional, 2 Sets.
A and B Pattern Hospital Canteens, 4 Sets, Old Pattern.

| Contents of each Set of Medical Comfort Boxes. | Old Pattern Contents. |
|---|---|
| No. 1:— | |
| Brandy .. .. .. 12 bottles. | "A" Canteen: *See* Invoice on lid. |
| Wine, port .. .. .. 9 „ | |
| " sherry.. .. .. 3 „ | |
| No. 2:— | |
| Essence of beef .. .. 10 lbs. | "B" Canteen: *See* Invoice on lid. |
| Arrowroot .. .. .. 10 „ | |
| Tea .. .. .. .. 6 „ | |
| Sugar, loaf .. .. .. 6 „ | |
| Mustard .. .. .. ¼ „ | |
| Pepper. .. .. .. ½ „ | |
| Salt .. .. .. .. 2 „ | |
| Preserved vegetables .. 5 „ | |
| Candles, composite .. .. 6 „ | |
| Soap .. .. .. .. 6 „ | |
| In Separate Cases. | |
| Oil, for lamps .. .. 3 gallons. | |
| Wick, for „ .. .. ½ lbs. | |
| Preserved milk .. .. 48 pints. | |

*Issued to each Regimental Medical Officer.*

1 Diary and letter-book.
1 Admission and discharge book.
1 Medical certificate book.
25 Morning states.
12 Weekly states.
15 Return of men sent to field hospitals.

DISTRIBUTION of Field Hospital Equipments, in Wagons.

| Totals. | First Wagon. | Second Wagon. |
|---|---|---|
| Medical comfort boxes .. 2 sets | 1 Set | 1 Set. |
| A and B canteens . .. 4 „ | 2 Sets | 2 Sets. |
| Marquees, complete .. 3 | 2 | 1 |
| Tents, circular .. .. 6 | 4 | 2 |
| Bags of bedding .. .. 9 | 6 | 3 |
| Buckets, water .. .. 8 | 5 | 3 |
| Spades .. .. .. 4 | 2 | 2 |
| Axes, pick.. .. .. 4 | 2 | 2 |
| Axes, felling .. .. 4 | 2 | 2 |
| Saws .. .. .. 3 | 2 | 1 |
| Hooks, reaping .. .. 18 | 9 | 9 |
| Stretchers .. .. 12 | 6 | 6 |
| Lamps operating.. .. 2 | 1 | 1 |
| Preserved milk .. .. 1 case | .. | 1 |
| Oil can, spare .. .. 1 | .. | 1 |
| Box of reserve instruments Medicines, &c.. .. 1 | .. | 1 |

*Camp Equipment for each Field Hospital.*

Marquees hospital, complete, 3; tents, circular, 6*; blankets, grey, 45; palliasses, barrack, 45; bolsters, 45; sheets, hospital, 45 pairs; ditto, waterproof, 45; belts, cholera, 45. The bedding packed in 9 bed bags. Buckets, water, 8†; spades, 4‡; axes, pick, 4‡; ditto, for felling, 4‡; saws, hand, 26 in., 3; hooks, reaping, 18; bearers, hospital, complete, 14; lamps for operating, 2. The beds and bolsters to be filled (if necessary) with straw, at place of encampment, 13 lbs. per bed and bolster; to be changed when considered necessary by the Medical Officer in charge.

*Transport for each Field Hospital.*

The carriage of marquees, tents, hospital equipment, supplies, &c., &c., 2 wagons; pack-horse for field panniers, 1; water cart, 1; ambulances, 20 per division.

To complete the sketch of the arrangements the following Table of the amount of tentage, number of servants and horses, &c., allowed, is added:—

| | Servants. | Horses. | Tents, Personal. | Tents, Office. |
|---|---|---|---|---|
| 1 Principal Medical Officer | 2 | 2 | 1 | 1 |
| For each field hospital: | | | | |
| 1 Staff-Surgeon | 2 | 2 | 1 | .. |
| 2 Staff Assistant-Surgeons | 2 | 2 | 1 | .. |
| 2 Wardmasters | .. | .. | .. | .. |
| 6 Ward orderlies | .. | .. | .. | .. |
| 1 Steward | .. | .. | .. | 1 |
| 1 Cook | .. | .. | .. | .. |
| 4 Officers' servants | .. | .. | .. | .. |

The weight allowed each officer for his personal baggage, inclusive of bedding, was for Regimental Field Officers, and Medical Officers with the relative rank of Field Officer, 80 lbs.; Adjutants and mounted Assistant-Surgeons, 60 lbs.; other Regimental Officers, 40 lbs. In addition, 22 lbs. per mess of three officers was allowed for cooking utensils, and 20 lbs. for the personal baggage of each private servant.

The following was allowed for the necessary books, &c., each officer had to carry:—

*"Divisional:" Principal Medical Officer's Office.*

Diary and letter-book, Queen's Regulations, Memorandum-book, Army list, Maps, Stationery, Nomenclature of Diseases: weight, 32 lbs.; box for books, 15 lbs.; table, 12 lbs.; two stools, 5 lbs.; chair, 6 lbs.: total, 70 lbs. If table and stools are drawn from the Control, a total of 168 lbs. will be allowed.

Medical Officers proceeding in charge of regiments and batteries will require Diary and Letter-book, Admission and Discharge-book, Medical certificate book, Morning States, Weekly States, Return of men sent to Field Hospitals. Stationery, 1 quire; Medical Regulations, ink: total weight, 6 lbs. To be carried with the Medical Officer's baggage, and to be allowed for.

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* Two for medical officers, 1 for surgery, 1 for stores, 1 for office, 1 for non-commissioned officers and men, Army Hospital Corps and officers' servants.

† Two for cookhouse.

‡ One for cookhouse.

§ Army Corps Orders, Aldershot, 7th September, 1870.

These articles for the Principal Medical Officer, with his tent and baggage, were conveyed with those of the Divisional Staff; those for Regimental Medical Officers, with the regimental baggage.

One blanket, in accordance with Clause 103, Army Circulars 1871, was issued for each non-commissioned officer or man, and for each horse; 1 pair forage nets, 1 fetlock chain and straps, 2 wooden pegs, 1 heel rope, 1 leather shackle, 1 corn sack, 1 nosebag, 1 waterproof sheet for each set of harness or saddlery.

*Issued to each Principal Medical Officer.*

One Diary and Letter-book, 1 Order-book, 1 Memorandum-book, 1 Map.

*Stationery.*—Foolscap paper, 4 quires; blotting, 1 quire; cartridge, ½ quire; wrapping, 4 quires; envelopes, No. 1, 75, No. 2, 50; quills, 12; steel pens, (12 in a box) 3 boxes; lead pencils, 2; ink, black, 1 quart; india-rubber, 1 piece; red tape, 1 ditto; ink bottle; ruler; desk knife.

All the books and these articles of stationery were packed in a box 30 inches by 15⅝ inches by 12⅝ inches, lent by the Purveyor.

*Issued to Medical Officers in charge of Field Hospitals.*

One Diary and Letter-book, W. O. No. 39; 1 Admission and Discharge ditto, W. O. No. 27c; 1 Medical Certificate ditto, W. O. No. 172; 25 Morning States, W. O. No. 986; 12 Weekly States, W. O. No. 294; 50 Returns of men sent to Field Hospitals, W. O. Form No. 73, special.

*Stationery.*—Paper, foolscap, 4 quires; blotting, 1 ditto; cartridge, ½ ditto; for wrapping medicines, 4 ditto; envelopes, No. 1, 75, No. 2, 50; quills, 12; steel pens (12 in a box), 3 boxes; lead pencils, 2; ink, black, 1 quart; indiarubber, 1 piece; red tape, 1 ditto; ink-bottle, ruler, desk knife.

*Reserve Medicines.*

Diarrhœa mixture, 12 ozs.; chloroform, 12 ozs.; tinct. opii., 1 lb.; sp. am. arom., 1 lb.; powders, Nos. 1, 2, 3, 4, 5, and 6, of each, 6 doz.; pills, Nos. 7, 8, 9, 10, and 11, of each 24 doz.; tablets, Nos. 12 and 13, of each 12 doz.; bandages calico, No. 12; ditto, suspensory, No. 12; calico, yards, 3; cotton wool, 1 lb.: candles, No. 6; wax matches, 1 box; gutta percha tissue, 1½ yards; pins, papers, 2; adhesive plaster, 3 yards; isinglass plaister, 3 yards; sponges, No. 6; tape, 2 pieces; linen sheeting, 1½ yards.

All these articles with the stationery and books were packed in a box 30 inches by 15⅝ inches by 12⅝ inches, lent by the Purveyor.

## APPENDIX No. VII.

## REPORT OF THE MEDICAL DIVISION OF THE ROYAL VICTORIA HOSPITAL FOR THE YEAR 1870.

With Remarks on some of the most important Diseases, illustrated by Cases from the Clinical and Post Mortem Registers. By Deputy Inspector-General MACLEAN, M.D., C.B., Professor of Military Medicine.

THE total number of men admitted during the year was 1,459. As 123 remained under treatment on the 1st of January, 1,582 have to be accounted for. Of these 250 were discharged to duty, 1,192 were discharged the Service, 52 died, and 88 remained on the last day of the year.

At first sight it must strike any one looking at the above figures, that 250* out of a total of 1,582 is a small proportion to return to active duty.

Some explanation of the fact appears to be necessary. This is to be found in the extreme gravity of a large proportion of the cases. Thus, 323 were cases of pulmonary phthisis, 214 were cases of heart disease, 102 were dysentery, and 147 were diseases of the liver, and 323 were cases of malarial fevers or their more serious sequels, such as enlarged spleen, general debility, anæmia, and the like, making up a total of 1,114 cases of the most destructive forms of tropical diseases.

It must be kept in mind that the vast majority of our invalids come from India, and that there is one feature common to them all; they are all "climate "struck," the malarial cachexy runs like a thread through all their ailments. The difficulty of expelling the malarial poison from the system is a truism in medicine. At the best, and under the most favourable circumstances, it is a work of time, and this is exactly what we have not at our command.

The Royal Victoria Hospital is the great invaliding hospital for the foreign stations of the army, and ample as is the accommodation within its walls, were the medical officers to detain every man until the sequels of malarial poisoning were so far overcome as to fit him for military service in any part of the world, the whole business of invaliding would be arrested.

Larger number of admissions at one time. Invalids cannot be detained for prolonged treatment at Netley

The admissions into hospital from India amount commonly to three or four hundred at a time, and as many as 850 invalids have had to be admitted and cared for in one day. The truth is that no invalids are, or can be, detained for prolonged medical treatment at the busy part of the year, excepting such as afford a well-grounded hope of being restored to efficiency within a reasonable time, or who are in such an advanced state of disease as to forbid their being sent to their own homes.

Many invalids discharged the Service who might be rendered effective, if time admitted.

It will thus be seen that we are obliged to send up for final discharge a considerable number of men, who might, time and circumstances permitting, be made once more effective. There is another point which the responsible officers at Netley have to keep always in mind.

* The above figures refer entirely to the clinical division where alone the gravest forms of disease are admitted. Out of 1,468 invalids admitted into the so-called convalescent division, 1,096 were restored to the Service.

When a soldier has been reported "fit" by a Board of Medical Officers, the military authorities understand the term in its ordinary sense, and deal with him accordingly; sending him back, it may be, within a few months, with the first draft of men to his regiment, to the same climate, perhaps to the same station where his disease was first contracted, before his constitution has been fortified by a sufficiently long stay in his native country. As might be expected, men so dealt with quickly relapse into their old condition; the medical authorities in India complain of the too early return of men invalided, and the financial authorities, not without reason, object to the cost of sending men back merely to spend their time in hospital until again invalided.

Soldiers reported "fit" liable to be sent back to India too soon.

If an arrangement could be made by which men discharged from Netley as "fit," could, as a matter of course, be employed for eighteen months or even a year on home service, it is certain that many men who under existing circumstances are discharged the Service might be made effective.

It is quite possible that the disadvantages of such a scheme might outweigh its advantages. This is a question for superior authority to decide, but it appears to me right that the facts of the case should be made known.

*Malarial Fevers.**—Two cases of intermittent fever remained, and 90 were admitted, of these 30 were found fit, 51 were discharged the Service, and 11 remained at the end of the year. Only one case of remittent fever was admitted.

I have little to say on the treatment of this class of fevers that has not been said again and again, at the stage of the disease reached by most of our Netley cases, the chief aim in treatment is to restore damaged organs to their normal size and function. Where time is given for the operation of the means used, we have no cause for disappointment. Patients are carefully scrutinized to detect any signs of the scorbutic cachexy, a not unfrequent complication in those who come to us after a long sea voyage, more particularly if they have served for any time in British Burmah, where, at certain seasons of the year it is difficult to cultivate suitable vegetables in sufficient quantity to form a part of the soldier's ration; so at least it is alleged in explanation of the above fact. It need hardly be added that the first object of treatment is to remedy this condition, which is a formidable addition to any form of malarial disease.

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* The opinion that there is no such entity as malaria has again been put before the profession in a recently published work by Assistant Surgeon Oldham, of H.M. Indian Army. "Malaria," according to this gentleman, "is chill," and I am informed that this opinion has been so enthusiastically embraced by another medical officer in India, as to constrain him gravely to advise the Government to stay their hands from all attempts to fight with and extirpate from the stations and cities of India a merely imaginary foe. Meanwhile, the authorities who have to deal with such opinions and recommendations, have before them another statement, derived from careful official documents, to the effect that in the Godavery district, in the northern division of the Madras Presidency, in the official year 1869-70, out of a population of 1,427,472, the deaths from fevers alone amounted to nearly 20,000. And Mr. Cornish, the Sanitary Commissioner for Madras, in his observations on this terrible fact, says, "that for every individual who dies of fever some fifty or sixty, or "even a larger proportion, suffers from a non-fatal attack of the disease." So that in the year 1869-70, when nearly 20,000 succumbed to the disease, over a million persons must have suffered in a total population of less than a million and a half. Terrible consequences to result merely from "chill," *vide* "Minutes of Proceedings "of the Sanitary Commissioner for Madras, April, 1871." The Sanitary Commissioner gives an explanation more in accordance with the facts of the case, with common sense, and the experience of mankind through many ages, and in many countries, to the effect that this dreadful mortality, "surpassing the deaths from "cholera, and nearly all other diseases put together," is due to the geographical position of the district and its exposure to malarious winds during the north-east monsoon season, proceeding from wild jungle tracts to the north of the district.

I append this note, not because I think that the "chill" theory is likely to meet with much acceptance among the medical officers of the British and Indian Armies, but because the shocking mortality disclosed in this report is well calculated to impress all medical and sanitary officers with the necessity for the careful study of everything relating to this class of fevers.

Scorbutic complications.

Scorbutic diarrhœa will often yield at once to milk diet, with a reasonable amount of fresh fruit, while such cases will resist all the astringents in the pharmacopœia in succession however skilfully prescribed.

No remedy is in more frequent use with us in the malarial cachexy than the syrup of the triple phosphates, quinine, iron, and strychnia, which seems to meet many indications; the strychnia is an admirable aid to digestion, the quinine exercises its controlling power over the paroxysms of fever, and the iron improves the blood, correcting the anæmic condition of the system.

Ointment of biniodine of mercury in enlarged spleen.

A more extended experience of the ointment of the biniodine of mercury has in no way diminished our confidence in the power of this remedy to remove the solid enlargements of the spleen so common after long residence in malarial climates. I have written so much on this remedy, that if it were not for a particular reason I would not have touched on it in this paper. Unwilling as I am to introduce any controversial matter into the Army Medical Departmental Reports, I am constrained to notice in this official manner a statement made by a gentleman holding a prominent position in one of our great schools of medicine, to the effect that at Netley, in a particular case, this remedy was used to the extent of producing salivation and to the detriment of a patient.

Professor Bennett on biniodine of mercury at Netley.

After a full and authoritative contradiction the statement was repeated, and is to be read in several of the leading medical periodicals. Once more I repeat the contradiction already given by me, and assert, that neither in the particular case alleged, nor in any other treated in the Royal Victoria Hospital did such effects follow the use of the remedy. We have never used it in the reckless manner of which we were accused by Professor Bennett, nor in a single instance has the well-known constitutional effect of mercury been observed after its use. Only a few weeks ago a lad, a drummer in the 2nd battalion, 21st Regiment, who was sent to Netley from Kurrachee, Scinde, was discharged in ruddy health; yet when he came to us his spleen extended downwards into the pelvis, a hard and solid mass, and beyond the mesial line of the abdomen from the ensiform cartilage to the pubis. Mainly by the use of this remedy, in the guarded manner habitual here, it was so reduced in size that when he left the house its lower margin could with difficulty be felt below the false ribs, and that only in particular positions.

While on this subject I think it due to the medical officers of the army to add, that the charge brought against them by Professor Bennett, on the same occasion—(the exact expression used was "that thousands of British soldiers are rendered unfit for service by mercurial treatment")—is certainly not supported by any evidence derived from a careful examination of the invalids at Netley.

Treatment of malarial fevers by the hypodermic injection of quinine.

This, it appears to me, is a fitting place to offer a few remarks on the treatment of malarial fevers by the hypodermic injection of the salts of quina.

That quinine when introduced into the system through the skin exerts its so-called anti-periodic powers with energy, has long been known. The plan first employed was to vesicate the skin and to sprinkle the drug on the raw surface. This method proved painful, always causing much irritation and not unfrequently troublesome ulceration. Drs. Guastamacchia and Daunt have followed the endermic method of using quinine in a manner not open to this objection. The former dissolved gr. viij in f 5 of spirit, and rubbed first one half, and after the interval of a quarter of an hour, the second half, along the spine. "When this was done at the commencement of the cold fit, it very "often prevented even a single recurrence."*

More recently quinine has been injected hypodermically in India and elsewhere in the treatment of intermittent fevers. Dr. W. J. Moore, of the Bombay Medical Service, has strongly insisted on the efficacy of this plan, which has been followed by other army surgeons in India, who urge it on the ground that it is both effective and economical. Dr. Moore dissolves thirty grains of the sulphate of quinine in 3ss. to 3i of water with from viij to

* "Edin. Med. Surg. Journal," lix., p. 473, and "Medical Times and Gazette," August 2nd, 1862. "Waring's Manual of Practical Therapeutics," p. 542

x. drops of diluted sulphuric acid, of this solution he injects from 3ss. to 3j subcutaneously, and has found the method successful "in thirty cases "of intermittent and several of remittent fever." More extended trials of this method have shown that in a considerable number of cases irritation, inflammation, and even troublesome ulceration have followed its use; due, it is believed, to the mineral acid which is the usual solvent of the quinine.

Some discussion having arisen in India on this subject the Director-General of the Medical Department of the Army was pleased to send the papers relating to it to me for report.

My first care was to examine the arms of the only four men on whom this operation had been performed in India, who happened to be at Netley at the time. In three out of four it was evident that ulceration had taken place, the cicatrices left being plainly visible at the points injected. I then attempted to discover a solvent capable of dissolving quinine, not open to the objection of being an irritant to the tissues. In this, after many trials, I failed. I next determined to try a salt of quinine more soluble than the disulphate, and selected the so-called neutral sulphate, which, however, is not neutral, for it gives a decidedly acid reaction with litmus paper. The neutral sulphate is a very soluble salt, as the following will show :—

Three grains dissolve in thirty minims of water perfectly.
Three grains dissolve in twenty minims of water with difficulty.
Three to six grains dissolve in ten minims of water with the aid of heat.

But in the last case crystals are quickly deposited on cooling or when the solution is agitated. I injected six grains of the neutral sulphate hypodermically, dissolved in 10 minims of water, without the aid of an acid, in six different patients at the time under treatment in our wards for intermittent fever, without, in any case, inducing any unpleasant effects, although all the men were in a state of health not favourable to the success of any operation however trifling, one, in addition to the malarial cachexy, having cavities in both lungs.

More extended trials than I have yet had an opportunity of making are required to determine whether the neutral sulphate is as effective as the disulphate in checking the recurrence of fever. In the trials above mentioned the paroxysms did not recur.

The proceeding is very simple, from three to six grains of the neutral sulphate are placed on a watch-glass, previously warmed, to this 12 minims of distilled water are added, and the glass is held for a second or two in the flame of a spirit lamp, or even near the fire. The syringe, previously warmed by placing it in water at a temperature of 100° F., is then charged with the solution, and the operation is completed in the usual way. It is essential to warm the syringe, if this is neglected immediate deposition of crystals follows and injection is impossible. Although it is thus possible to inject so considerable a quantity as six grains in only ten or twelve minims of water, it is better to add five, or even ten minims more, which will make the solution more perfect and facilitate its absorption without adding to the difficulty of the operation. By using the neutral sulphate in this way, I am sanguine that all the good effects of the hypodermic method will be obtained without any of the inconveniences which have often followed the disulphate dissolved by a mineral acid.

This method of using quinine is likely to be useful chiefly in that formidable class of remittents in which gastric irritability is so extreme as to make medication by the mouth almost impossible. The power of quinine in moderating the dangerously high temperature which attends sunstroke seems well established. In extreme cases of this formidable affection where the power of swallowing is lost, the patient can rapidly be brought under the influence of the remedy by the hypodermic method.

Use of hypodermic method by Dr. Bovious in some remittent fevers in Madagascar.

Since I addressed my memorandum to the Director-General on this subject, I find that in a very formidable form of malarial fever which lately prevailed at St. Marie, in the island of Madagascar, and to which the name of "remittent "bilious ictero-hæmorrhagic fever" was applied, the hypodermic method of using quinine was successfully followed by Bovious. Before injecting, I observe

that Bovious recommends, what I have myself found necessary in my own trials, viz., that the syringe should be warmed to the temperature of the patient before using it. The hypodermic method of administering quinine appears to have been forced on this physician by the "impossibility of administering quinine by "the mouth on account of the severe gastric irritation present," the same reason as that given above, and which has been experienced by every physician who has had much to do with severe remittents in hot climates. The syringe used by me was made for the purpose. It is larger and stronger than the one in use for the injection of morphia. The perforated needle is made of platinum, and after using it I invariably carefully wash it out with a solution of carbolic acid, to prevent the possibility of injecting the next patient with decomposed blood, a precaution too often neglected in all similar operations.

Phthisis.

*Phthisis Pulmonalis.*—Sixteen cases remained at the end of 1869; 307 were admitted, 22 died, 11 were discharged to duty, 275 were discharged the Service, and 15 remained on the 31st December, 1870.

Of the above, 307 were from foreign stations.

Phthisis not rare in tropical climates.

Phthisis, as might be expected, ranks as our most fatal disease. The opinion put forth by Boudin, by Nepple, by Drake, and others, that phthisis is a rare disease in malarial climates, meets with no support from our experience at Netley. British troops serving in the most malarious climates of India enjoy no exemption from this disease. On the contrary, there is much reason to believe that the depressing effects of the malarial poison on the constitution is a powerful aid to the vitiated atmosphere of barrack-rooms, in at least predisposing to this disease. Out of 2,769 cases of phthisis admitted since the month of March, 1863, when the Royal Victoria Hospital was opened, to the 31st of December 1870, India furnished 1,169.

Much of the destruction of lung tissue in the Army not due to tuberculosis.

How much of the phthisis so unhappily common in the army, is due to tuberculosis is a question that cannot yet be answered with precision. There is, however, strong ground for the belief that in a large proportion of the cases discharged from the army on account of phthisis, the destruction of lung tissue is not due to tuberculosis at all, but to the metamorphosis of the deposit (exudation) the result of certain forms of pneumonia, as described by the late Dr. Addison, and more recently by the lamented Niemeyer.* Those who have gone through the course of instruction in the Army Medical School must remember how often their attention has been called in the clinical wards to cases of so-called tubercular phthisis like the following. The man brings with him a history of cough, muco-purulent expectoration, loss of flesh, night-sweats, with a statement of physical signs pointing to the breaking up of lung tissue. On arrival at Netley, there is often discovered a notable discrepancy between the man's present condition and his antecedent history. He has little, sometimes no cough, the expectoration has ceased, or diminished to a little thin mucus, observed only in the morning; there are no night-sweats, the temperature, morning and evening, is normal; his appetite has returned, he digests and assimilates food well, in proof of which he is gaining flesh; yet when physically examined signs of past mischief are not wanting, such as want of symmetry between the two sides of the chest, with dulness and absence of normal breath sounds under one clavicle, sometimes under both, or more frequently over a circumscribed space in one or both lungs posteriorly.

In some cases the dulness may be more general over the whole posterior surface of the chest on one side. With the exception of some dyspnœa on exertion, the man suffers little inconvenience, considers himself "well," often wishes to return to duty, and, in a word, may be said to be living at a fair, if not a high standard of health. It is impossible to suppose that miliary tubercles constitute the deposit in the lungs of men in this condition. The absence of all signs of constitutional irritation, cough, fever, high temperature, night-sweats, some or all of which symptoms we look for, however

* Dr. C. J. B. Williams, F.R.S, and his son, Dr. C. J. Williams, have published an analysis of one thousand cases of pulmonary consumption, the number preceeded by pleuro-pneumonia was 149, by bronchitis, 118, more than one-fourth of the cases are considered to have their source in these inflammatory diseases.

sparsely miliary tubercles may be scattered about the lungs, even when there is no dulness on percussion or bronchial breathing to indicate their presence.

It is more reasonable to look at such cases from the point of view opened to us by the investigations of Benno Reinhardt, Addison, Niemeyer, and others, and to regard the conditions described above, as the result of low forms of pneumonia with exudation which has not been re-absorbed.

Men in this condition are discharged the service, because, even if they could be said to be in some cases tolerably able to do duty, it would be unfair to expose them again to the unfavourable conditions of barrack life, certain, sooner or later, to cause renewed attacks leading to fresh induration, with metamorphosis of the deposit already existing, and softening, and destruction of lung tissue.

In other cases, after a history in its leading points much the same as that of the large class described above, with the usual addition of one or more attacks of hœmoptysis, the physical evidence of a cavity is present with dulness in its vicinity, with the same absence of constitutional irritation and disturbance. Here, too, it is probable that the cavity is not the result of tubercular deposit, and softening, but of pneumonic induration with subsequent softening and destruction of lung tissue. One reason why so little constitutional disturbance is present in such cases, is the manner in which the cavity is cut off from the sound part of the lung by plastic effusion, or some unsoftened part of the original deposit, evidenced by the dulness so often found in such circumstances. I infer that this dulness is not due to the presence of miliary tubercle, for the same reason as given above. If tubercle were present we should expect irritative cough, increased frequency of respiration and febrile temperature morning and evening, symptoms not observed in the class of cases now described. There is no subject more worthy of the careful attention of Army Medical Officers than the question of the causation of phthisis. If it be true that a not inconsiderable number of cases have not a tubercular origin, are not due to hereditary taint, in a word, to constitutional causes more or less beyond our control, we may take a more hopeful view of the possibility of diminishing the mortality from the destructive lung diseases we now group under the name of phthisis than has yet been done.

So much has been said on the powerful influence of the vitiated air of barrack-rooms that it is hardly necessary to say more on the subject than this, that medical officers should never relax their efforts to secure for the soldier as pure an atmosphere as is possible, whether he serves in a hot or a cold climate, drawing encouragement from the fact so much insisted on by Dr. Parkes, that phthisis, as a military disease, has diminished exactly in proportion as we have improved the air in barracks. It is impossible to doubt that although much has been done in this direction there is still room for improvement. The statistics of the Brirish Army have done much to explode the vulgar belief that phthisis is peculiarly a disease of cold climates. The large contingents of phthisical subjects contributed from India, from the Mediterranean, from the West Indies, point to the fact that something beyond merely climatic influence is required to secure immunity from this scourge of armies. Making every allowance for this, it seems certain that under present arrangements more difficulty is experienced by medical officers serving in cold climates in securing proper ventilation than in warm regions. Inspector-General Muir, C.B., informed me, that when he served in Canada, as Principal Medical Officer, the soldiers suffered from want of proper ventilation, but as the effects of breathing a vitiated atmosphere were not *immediately* appreciable in an increase in the number of men in hospital, he found it difficult to impress the minds of the military authorities with the importance of the subject.

Difficulty of securing proper ventilations in barracks in very cold climates.

At that time the number of British troops serving in Canada was in excess of the ordinary barrack accommodation, many were consequently quartered in houses not constructed for the reception of such a number of inhabitants as were then crowded into them. An attempt was made to ventilate the rooms by apertures communicating directly with the open air, but such was the rush of cold air into the foul and heated rooms that the men would not bear it, and at once closed them. When the invaliding season came round the effects of the vitiated air breathed during a long North American winter, were

made too evident in a considerable increase of phthisical cases. Nor should army medical officers, when seeking to deal with the causes of phthisis omit to keep in mind that it is not gaseous impurities only that may act in a septic manner. In the clinical wards at Netley, where we have always a large number of phthsical patients, the ward sisters are instructed to see that the pots containing the sputa of patients are frequently washed out, to diminish as much as possible the risk of dry pus cells being suspended in the air and carried into the respiratory passages of patients suffering from other diseases. Yet in spite of such a precaution the experiments made by Staff-Surgeon R. Watson, at Netley, have demonstrated the presence of "pus corpuseles and "to all appearance the peculiar cells of tubercle" in the air of a fairly ventilated ward. (*Vide* Army Medical Departmental Report, vol. xi., p. 532).

Dried puscules suspended in the air of certain wards at Netley.

In considering the causation of army phthisis we must not omit the effects of the faulty system of clothing and accoutreing the soldier. I am far from wishing to exaggerate the baneful influence of this bad system. At first sight it may not be easy to see how it can act in predisposing to destructive lung diseases. But that it does so I cannot doubt. It has been demonstrated (Hunter, Parkes, Maclean, Myers, Reports of Pack Committee) that tight clothing and ill contrived accoutrements interfere with the mechanism of breathing, shorten the respiratory act, lessen the amount of air entering the chest, and impede blood depuration. Nor is this all, the ultimate effect is to damage the heart to such an extent as to render the sufferer liable to congestion of the lungs from slight causes, and so to complicate every attack of a pneumonic kind from whatever cause arising.

Faulty system of clothing.

The labours of the Pack Committee have, it is true, resulted in the introduction of a nearly perfect system of accoutreing the soldier, but medical officers should bear in mind how much mischief in this direction may still be done by tight fitting tunics, and should be on their guard against that almost incorrigible tendency in the military mind, to sacrifice health on the shrine of "smartness."

Effects of limited resources in recruiting.

If we proceed to institute a comparison between the comparative prevalence of phthisis in our own and continental armies, we should bear in mind the wide difference between our system and theirs in the all-important method of recruiting. The great military powers can cast a net over the length and breadth of the land, and draw into it every male of the military age, and can sift out for their purpose the very flower of the population. Great Britain is restricted to what can be had in the voluntary market "We have to take what we can get, and be thankful." How soon we get to the end of our resources in this way was well seen after the war in the Crimea, and the trying crisis of the sepoy mutiny in Bengal. Under the pressure of necessity the medical examination of recruits was then somewhat relaxed, and the result was that our depots were filled with poor phthisical lads, who broke down in their drill, and after costing the country much money, were discharged without having rendered any real service to the country. In quiet times this evil is of course less felt, but as the source from whence recruits can be obtained is limited, the authorities are always driven to employ immature lads as if they were full grown men in all climates, and this leads to much invaliding and mortality, from the class of lung diseases under review.

From our table of fatal cases from phthisis I present four, selected from those of a non-tubercular character, or where, tubercles being found, they appear to have been of secondary formation.

*Miners' Phthisis.*—Destruction of lung tissue independent of tubercule.

Private James Forsyth, 2nd battalion 21st Regiment, age 30; date of admission, 21st June; date of death, 23rd of July; of inspection, 24th July; completed years of service, eleven, of which five spent at home, the remainder in India. No admission into hospital during home service. In India was four times treated for dyspepsia, twice for diarrhœa, once for ebriositas, once for chronic hepatiis, and was thirty-four days in hospital with anæmia.

Abstract states, "For the past five months has suffered from dyspepsia, "with general debility and anæmia. with loss of flesh. Unfit for military duty "and invalided to England. On admission into Netley Hospital, the patient "stated he had been a coal miner for thirteen years before he became a soldier

" (worked in the mines as a boy), had fair health until four months ago, when " he says his present illness commenced with dyspeptic symptoms, loss of flesh " and cough. No history of rheumatism or of syphilis."

He was in a state of extreme emaciation, had no appetite, and complained of pain, which was general over his whole body. He coughed almost incessantly, and expectorated with much straining, a great quantity of viscid black sputa, nummular in form, containing carbonaceous matter in a very minute form. His debility was so extreme that only an imperfect examination of his chest was possible.

There was great dyspnœa, the respiration 38 per minute, signs of cavities in both apices, and respiratory sounds feebly audible at left base.

From the time of his leaving his old occupation until destruction of lung tissue commenced never had black sputa. He remained under treatment for a month, gradually becoming weaker, exhaustion at last became extreme, and he expired on 23rd July.

*Examination after Death.*—Body much wasted.

*Pleura.*—Pleural adhesions at both apices.

*Bronchi.*—Contained black muco-purulent fluid, mucous membrane of normal colour.

*Lungs.*—Both lungs augmented in bulk, do not collapse, and are consolidated, except at their bases.

The right lung could only be removed by tearing open a large cavity in the apex, leaving the outer boundary of the cavity adherent to thoraic parietes.

On section it is of a black carbonaceous colour, deepest in upper third, quite at the base the colour was that of normal lung with numerous small deposits of black matter. In the upper lobe there was a cavity the size of a man's fist hollowing out the apex. Its upper and posterior boundaries were formed by thickened pleura with a thin lining of blackened pulmonary substance. The interior of the cavity was lined by blackened and consolidated tissue easily broken down.

The mouths of the air tubes opened into the cavity.

The lung substance in the vicinity of the cavity was of a perfectly black colour, of dense consistence, and presented grey miliary looking granulations, uncoloured, in the black substance. Many of the growths are aggregated, and breaking down have formed small cavities about the size of a pea, containing a blush-grey fluid, consisting of pus corpuscles with particles of carbon in a very fine state of division.

The lowest lobe is crepitant, reddish in colour at its base, with numerous spots or deposits of black matter, about a quarter of an inch in diameter, in the centre of these pigmented spots is seen the open mouth of a small air tube, from which some frothy fluid can be expressed, a few tubercle like growths are sparsely scattered throughout the lowest lobe.

*Left Lung.*—Tubercle growths felt in handling the lowest lobe, a large cavity in the apex, similar in all respects to that in right apex.

The upper lobe of a dense black colour with deposits of white cheesy matter uncoloured, and situated in the black consolidated structure.

The upper half of the lower lobe is consolidated, contains some densely aggregated tubercle growths surrounded by black carbonaceous tissue. The lower half of a reddish colour, spongy, and contains the carbonaceous deposit surrounding the smaller air tubes.

*Heart.*—White opacities in the course of the coronary vessels, orifices normal, texture of aorta normal.

This is the only case of miners' phthisis I have met with in the army. Remarks.
The patient assured me that for eleven years after leaving his occupation he had no black sputu, which did not appear until he had suffered from cough for some months, in fact, not until the lung began to disintegrate.

There are three specimens of so-called melanosis of the lung in the museum of the medical department of the army, but no history is attached to any of the preparations. No. 679 is entered in the catalogue as " portion of right " lung containing extensive melanotic deposit."

680. " Section of lung showing spurious melanosis."

In this specimen a considerable quantity of black carbonaceous matter, evidently coal in a state of minute division, has collected in the bottom of the jar.

681 is a "portion of lung loaded with black carbonaceous matter, probably "taken from the body of a coal miner." Donor, Dr. Thompson, late Professor of Practice of Medicine, in the University of Glasgow.

Dr. Thompson published two papers, on "Black Expectoration and Black "Matter in the Lungs," in the 20th and 21st vols. of the Medico Chirurgical Transactions, 1836–1838. There is another preparation, No. 682, of pulmonary appoplexy, with incipient melanosis. This specimen is a perfect illustration of the description given by Laennec of melanosis of the lung in its earliest stage. The section of the lung has a greyish tinge, the black matter being disseminated in small black points, which being more numerous and more thickly set along the intersections of the pulmonary lobules form there strice, small spots, or dotted lines.

Comparing the specimens in the museum with the case given above, I have no doubt that every one of the persons from whose bodies they were taken were coal miners at some time of their lives. It is clear, however, that in all the above cases the black colour of the lungs is not due entirely to coal. A careful examination of the preparations showing that there is also true hœmatoidin pigment, the result of the irritation processes excited by the coal dust.

*Phthisis Pulmonalis.*—Cheesy deposit in left lung.

Private John Garrey, age 20, admitted 9th July, died 17th October. Disease contracted in India.

*Hereditary History of Phthisis.*—Had syphilis two years ago, habits intemperate, and was twice under treatment in India for mental disease. When admitted into the clinical division was greatly emaciated and much prostrated, pulse 120, very feeble. Respirations 26 per minute, temperature 103°, cough frequent and troublesome, with profuse purulent expectoration.

Physical signs indicated the existence of cavities in the right apex, and consolidation of the lung below the cavities to the base.

The left lung much consolidated, no physical signs of cavities; bronchophony was noted. He suffered from diarrhœa and died from exhaustion on the 17th October, retaining his mental faculties to the last.

*Post Mortem Examination.*—Body much emaciated.

*Head.*—Sub-arachnoid effusion with opacity of arachnoid.

*Brain* 2 lbs. 15 oz.—Convolutions of the cerebrum small; texture of brain generally firm and normal.

*Tonsils and Uvula.*—Enlarged and indurated.

*Cervical and Thoracic Glands.*—Enlarged.

*Larynx.*—Ulceration, with diptheritic exudation on the laryngeal surface of the epiglottis, extending throughout the larynx and trachea.

*Chest. Pleura.*—Adhesions of the pleura general and firm on both sides.

*Lungs.*—Right lung does not collapse; in its apex, two large cavities lined with an exudation similar in appearance to that coating the larynx and trachea; other smaller cavities irregularly disposed throughout the substance of the lung, the texture of which is consolidated.

These cavities are lined with a greyish membrane, and contain purulent fluid; miliary tubercles occupy the lung substance; *masses of cheesy accumulations* occur in the more healthy portions of the lungs; some of these have a nodular form, are isolated, and contain tubercle.

*The left lung* is much contracted; in its substance are cheesy deposits, commencing to soften; scarcely any portion of the left lung is crepitant, excepting the edges.

The pleura, situated over the softened deposits, is marked by cicatricial depressions; weight of lungs, 3 lbs. 13 ozs.

*Heart.*—White opacity on anterior surface; small and flabby, with dark coagula in left side; valves normal.

*Abdomen. Stomach.*—There is some congestion, with effusion on the surface of the mucous-membrane of the stomach.

*Small Intestines.*—There is catarrhal exudation on the mucous surface of the lower portion of the jejunum; cheesy deposits in the solitary glands and in Peyers patches; some of these deposits have softened, and around them is ulceration, with injection of vessels in the vicinity; no re-action with the iodine test.

*Cæcum.*—Irregular ulceration of the mucous surface.

*Colon.*—Pale and bloodless; there is pigmentary deposit in the solitary glands.

*Rectum.*—Ulcerated with pigmentary deposit round the ulcers.

*Liver.*—Opacity of the capsule; texture swollen; two commencing cicatricial depressions on upper convex surface; lobules indistinct.

*Spleen.*—Enlarged and mis-shapen; capsule opaque and thickened, texture friable; the malpighian glomeruli exhibit lardaceous degeneration.

*Kidneys.*—Surface of kidney uneven; stellate congestion; substance normal.

*Phthisis Pulmonalis.—Cheesy transformations, surrounded by inflamed lung tissue in left lung.*

Gunner John Hill, 5th Royal Artillery, age 26.

Prior to enlistment this soldier was an agricultural labourer. Symptoms of pulmonary phthisis first appeared at Madras, in February 1869.

For these he was sent home, and found unfit for service at Netley. While awaiting his final discharge he was attacked with fever of a low type—headache, high temperature, and great debility were the prominent symptoms.

The tongue was coated with brown fur; the lips and teeth were covered with sordes.

Delirium ensued and death.

He was admitted on the 13th February, invalided in March, and died on the 14th August.

*Post-mortem Inspection.*—Body emaciated.

*Head.*—Effusion of yellow lymph, chiefly on the right of arachnoid membrane.

*Brain.*—Weight, 3 lbs.; substance generally firm.

*Ventricles.*—Enlarged; distended with clear serum; walls softened and broken down.

*Chest.*—Thoracic glands enlarged and infiltrated with cheesy deposits.

*Larynx.*—Small superficial ulcers on vocal chords.

*Lungs.*—General adhesions of the right lung to thorax; substance of right lung condensed and studded with grey miliary tubercles; in upper third two cavities, each in size about that of a walnut, communicating and filled with dark coloured purulent matter; pulmonary texture crepitant at base; weight, 1 lb. 14. ozs.

The upper part of the left lung was in a similar condition to that of the right, tubercular deposition and cavities occupying the apex of lung. The lower part of this lung contained deposits of yellow cheesy matter, surrounded by injected tissue; weight, 1 lb. 6 oz.

*Heart.*—Normal.

*Abdomen.*—Mucous membrane of small intestines congested; Peyers patches infiltrated with tubercular material; three or four of these patches are extensively ulcerated; marks of previous ulceration in other portions of the gut.

*Cæcum.*—Some ulceration of the mucous surface of the cæcum.

*Liver.*—Opacities on surface of capsule; incipient cirrhosis and fatty degeneration of hepatic substance.

*Spleen.*—At lower end of spleen a mass of yellow cheesy matter was imbedded in the splenic substance.

*Lumber Abscess, with Phthisis.*—Cheesy deposit in right lung.

Corporal John Gurney, age 22, 85th Regiment, admitted 10th July, 1869, died 21st January, 1870.

This man had a distant syphilitic history.

Disease commenced in April 1869, while stationed at Gibraltar. He then complained of pain in left lumbar region, where a tumour appeared, which was opened, and a large quantity of pus discharged.

Pus continued to discharge from the wound to the time of his death. On admission the patient was much emaciated and very weak. He had cough and muco-purulent expectoration, nausea, constant night sweats, and diarrhœa; latterly some rigidity of lower extremities; before death ascitis, for which paracentesis was performed.

*Post-mortem Inspection.*—Body greatly wasted.

*Head.*—Opacity of the arachnoid, with some subarachnoid effusion; congestion of pia mater.

*Brain.*—Texture firm.

*Pleura.*—Adhesions on both sides.

*Lungs.*—Both lungs consolidated; isolated nodules of cheesy matter irregularly scattered throughout left lung, and in process of softening. Cavity in apex of right lung containing soft cheesy matter.

*Stomach.*—Lardaceous degeneration of mucous surface, and of mucous-membrane of small intestines; Peyers patches atrophied; ulceration of the patches in the ileum.

Large intestines extremely ulcerated throughout, with atrophy of textures, and lardaceous degeneration surrounding the ulcerated portion of the solitary glands.

*Liver.*—Capsula opaque, liver enlarged, acini distinct, texture intensely lardaceous.

*Spleen.*—Supplementary spleen the size of a marble attached to spleen; organ pigmented; glomeruli visible, and intensely lardaceous.

*Kidneys.*—Capsule adherent; congestion upon surface of cortical portion; malpighian bodies lardaceous.

Abscess of lower part of spine, with disease of bodies of lumbar vertebræ.

*Pneumonia.*—Sixteen cases were admitted—11 from India, 2 from other foreign stations, 3 from men belonging to the army hospital corps employed in the hospital.

In explanation of the anomalous circumstance of so many cases of an acute disease being entered as "from India," it must be understood that, although the invalids came from India, the disease was of home origin. The men had all been sent from India for other causes, and contracted the disease, which was most urgent on admission in the English Channel, or during the exposure, at the time of disembarking, to cold weather at Portsmouth, or on the journey from that place to Netley.

I have elsewhere pointed out how prone men labouring under any form of the malarial cachexy are to suffer from exposure to wet, or cold, or both, and the necessity of the greatest caution, if invalids in this condition are brought to England in the winter or spring months of the year.

Neglect of proper precautions is invariably attended with serious and often fatal consequences. On more than one occasion the warm underclothing provided on embarkation for the use of invalids on the voyage from India round the Cape of Good Hope, has been taken from them at the time when it was most required—when disembarking.* The medical authorities at Netley have had to point out that, in consequence, many invalids have suffered most seriously either from aggravation of their original ailments, or the engrafting of serious complications on them, such as pleuro-pneumonia, bronchitis, or congestion of the kidneys. The eleven cases of pneumonia were all the result of exposure to cold in the channel, or, as just mentioned, at the time of disembarkation. Three of the cases proved fatal.

The rapidity with which consolidation of the lungs takes place in men whose constitutions have been impaired, and blood impoverished by malaria, is what might be expected under the circumstances, and when in such cases the exudation pervades both lungs, the prognosis is most unfavourable.

I subjoin two of the fatal cases:—

Case of typhoid pleuro-pneumonia in a man debilitated by Indian service, malarial fever, and intemperate habits, the pleuro-pneumonia involving the pericardium with rapid collapse, with scarcely any of the symptoms during life that depend on the re-action of the nervous system, on account of the exhausted and shattered state of the system. Result:—Typhoid pneumonia, anatomically, simple grey hepatization of left lobe:—

Gunner Wm. Whelan, Royal Artillery, age 42, admitted from on board ship 9th February, died 22nd February.

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* The explanation of this most objectionable practice is to be found in the fact that hospital clothing, as well as all hospital stores, are handed over to the captain of the ship, who having to deliver them up on the completion of the voyage, insists on their being restored to him when the invalids leave the ship. Clearly he ought to receive not the clothing, but a receipt from the Medical Officer in charge, who in his turn will receive one from the Control Officer at Netley.

This man was invalided from India, quite broken down by 19 years' service, and frequent attacks of disease.

Reported sick on 19th, having been some days in convalescent division. Symptoms:—Great nervous depression; muscular prostration; temperature, 104° F.; diarrhœa, no cough, no expectoration, no pain of chest, lower two-thirds of left lung posteriorly dull on percussion, breathing bronchial, pulse 132, prostration extreme, delirium, death; no rash, no abdominal tenderness.

*Post-mortem Inspection.*—Dura mater more distended than normal, arachnoid opaque, sub-arachnoid œdema on convex surface, and dependent parts.

*Cerebrum.*—Convolutions over vertex slightly irregular, as if shrunken, but the change is slight and limited in extent; ventricles distended with clear serum, choroid; plexus studded with minute cysts.

*Pleura.*—Both lungs slightly adherent.

*Bronchi.*—Certain tenaceous expectoration.

*Lungs.*—Left lung does not collapse; firm anteriorly; slight effusion of flocculent sero-fibrinous fluid; recent effusion of lymph over upper lobe, which is entirely hepatised, in part entirely solid, grey, easily friable. The hepatised lobe extends down to the diaphragm; hepatised lobe contains in its centre a small cheesy deposit; right lung throughout congested, but permeable to air; some cicatricial shrinking of apex, and emphysema of inner margin.

*Pericardium.*—The recent pleuritic effusion extends to pericardium, and especially the serous lining of aorta, pulmonary artery, and over the whole left portion of pericardium.

*Heart.*—Large white spots anteriorly, left side hypertrophied; endocardium thickened, mitral valve thickened, deposit of fat on heart.

*Aorta.*—Atheromatous degeneration.

*Stomach.*—Signs of chronic gastritis.

*Small Intestines.*—Slight irritation in upper part, Peyers patches atrophied, large intestines normal.

*Liver.*—Large, otherwise normal.

*Spleen.*—Darkly pigmented, glomeruli not distinct.

*Pleuro-pneumonia and Pericarditis*—Private W. Falkender, 2nd Battalion 21st Regiment, age 27.

Invalided from India, where he had served for seven years, and suffered from various diseases—syphilis, dyspepsia, bronchitis, hepatitis.

Admitted at Netley 4th April, 1870. While on board ship, some days before admission, was attacked with rigors, severe pain in left chest, followed by cough and expectoration. On admission, cough, with viscid greenish expectoration, high fever, temperature 104°, pulse 120; left lung, dulness throughout, with faint crepitation and tubular breathing; right lung, dulness partly general, with bronchial breathing, extreme prostration from first; death, 8th April.

*Post-mortem Inspection.—Head.*—Unusual thickness of skull, considerable thickness and opacity of arachnoid, with sub-arachnoid œdema. Pia mater very vascular, brain of natural size and normal, tongue black and dry, pharynx deeply cyanotic, larynx livid, cyanotic.

*Pleura.*—Fresh exudation of coagulated lymph in left pleura, extending over pericardium to right pleura.

*Left Lung.*—Apex to base totally hepatized (intermediate stage between red and grey hepatization), no old adhesions, a few old cicatricial contractions and calcareous concretions in apex (slight remains of some previous tubercular deposit); bronchial lining intersely inflamed, with thick purulent secretion, which appears wherever a bronchial branch is divided.

*Right Lung.*—Expanded, full of blood, dependent parts somewhat œdematous, but nowhere void of air.

Weight of right lung, 2 lbs. 7 ozs.

Weight of left lung, 3 lbs.

Pericardium immensely thickened, infiltrated, and vascular; sac filled with sero-fibrinous effusion, both layers of pericardium coated with fresh lymph, inner surface intensely red and vascular.

*Heart.*—Of natural size and firm, endocardium and valves normal; firm clot of fibrin in right side of heart, extending into pulmonary artery.

Weight of heart, 11½ oz.

Terrible Suffering from Stretching of Nerve Filaments over the Sac.

Hypodermic Injection of Morphia.

Every now and again we get cases of abdominal aneurism presenting the acme of human suffering; doubtless from the stretching of nerve filaments over the distended sac. Such men we are obliged to retain until they die from rupture of the sac or exhaustion. Life can only be made tolerable to men in this condition by the careful use of the hypodermic injection of morphia, which requires to be done twice, sometimes three times a-day, gradually increasing the quantity. It is a standing rule at Netley never to begin the use of this powerful remedy with more than one-eighth of a grain of morphia.

I subjoin two out of six of our fatal cases of disease of the heart.

*Valvular disease of the heart, hypertrophy, dilatation of heart, aortic aneurism, aneurismal dilatation of sinuses of Valsalva, obstructing the pulmonary artery to a considerable degree.*

*Hydrothorax of both sides, pulmonary apoplexy of both lower lobes, pneumonic hepatization of left lower lobe around hæmorrhagic infarction.*

Private Charles Martin, 71st Foot, age 27, admitted 27th April, died 18th June, eight years' service—four at home and in the Mediterranean, the remainder in India.

The disease from which he suffered most in India was malarial fever; no rheumatic history.

A man of intemperate habits, thrice tried for drunkenness, employed at Gibraltar in a small ill-ventilated back-room, to which he was confined for many hours in the day as a clerk for more than six months. While thus employed felt first symptoms of his complaint during the hot season. In the beginning of January 1870 it was noticed for the first time that his heart was affected, and in February he was admitted into hospital.

*Symptoms.*—Extreme palpitation in recumbent position; dyspnœa on exertion, irritation at lower part of trachea, pulse 110 to 120, moans and is disturbed in his sleep.

Physical signs of hypertrophy of heart, with dilatation, were noted, with both aortic and mitral insufficiency, a blowing sound heard along the aorta to arch, and a double blowing murmur at the base near the middle of sternum; had no mercurial treatment.

Two days after admission into Netley, became anasarcous; abdomen began to fill rapidly, dyspnœa much aggravated, began to spit blood early in May. June 8th, visible pulsation on all large vessels, pulse very weak, dicrotous, 130, venous pulsation in neck, cardiac impulse increased in extent, wavy pulsation at epigastrium, increase of cardiac dulness especially downwards, distinct presystolic bruit most audible an inch to the left and below nipple; over the second costal cartilage there is a distinct single bruit, which now and then becomes doubled; no bruit in the larger vessels, face and nails cyanotic, œdema of lower extremities, ascitis, great dyspnœa, constant cough, with expectoration of mucous, and of blood in small clots.

In left lung fine moist crepitation (œdema) in the right as high as fourth rib; complete dulness, with crepitation above, no respiratory murmur, appetite bad, vomiting, with blood.

Bowels constipated, no enlargement of liver or spleen, skin dry, cuticle desquamating, no perspiration, urine scanty, specific gravity 1064.

Rapidly got worse: dyspnœa increased.

*June 13th.*—Pulse intermitting 130, sputa increased, full of blood, conjunctivæ yellow.

*June 16th.*—Anasarca increasing, great pain of left side of chest.

*June 17th.*—Unable to expectorate, dyspnœa, cyanosis increased, anasarca progressing, losing consciousness.

Died 11.50 A.M. 18th June, 1870.

*Post-mortem Examination.*—Large body, high degree of lividity of head, neck nearly black, general anasarca.

*Head.*—Great lividity of scalp, with intense congestion.

*Dura mater* distended, full of dark liquid blood.

*Arachnoid.*—Very slightly opaque.

*Pia mater.*—High degree of venous congestion.

*Cerebrum.*—Brain voluminous, convolutions distinctly flattened, substance congested, flabby, and discoloured from advancing decomposition.

*Pharynx.*—Dark bluish red; *Larynx* and trachea of a deep cyanotic colour down to division of bronchi.

*Pleura.*—On removing sternum, pericardium is seen immensely distended, chiefly to the left of the median line, completely filling the space between the left nipple and false ribs, and not covered by any portion of the lung. Both lungs are quite free in the pleural sac, considerable amount of hydropic effusion in both pleural cavities, uniformly compressing the lungs by about one-third of their volume.

Bronchial tubes filled with frothy sanguineous mucus.

*Lungs.*—Upper and anterior portion of both lungs collapsing, crepitating, full of blood, but quite free from mucus or other effusion, lower lobes on both sides partly consolidated, very firm, and hard.

*Right* lower lobe contains several isolated patches of hæmorrhagic infarction, one large one in the centre about the size of a hen's egg, several smaller ones well defined, intervening substance slightly congested, crepitant.

*Left* lower lobe: one large portion extending from the centre to the periphery, and occupying about half of the lobe, infarcted, surrounded by reddish grey hepatization. The similarity of the two processes and their distinction extremely well marked, the entire areolar structure being infarcted (consolidated) in the first with blood, in the second with so-called pneumonic exudation, the physical effect being the same in both, complete consolidation, with exclusion of air, weight of right lung, 2 lbs. ½ oz.; of left, 1 lb. 13 ozs.

*Pericardium.*—Greatly distended with clear serum, two large white patches on the anterior surface of the heart.

*Heart* uniformly and considerably enlarged, apex of heart round and entirely formed by left ventricle.

Muscular walls slightly thickened, heart flabby, collapsed, the liquid contents having escaped, cavity of right ventricle considerably dilated, mitral valve a little shortened, chordæ tendineæ decidedly short, marked incompetency.

*Semilunar Valves of Aorta* imperfect; one of natural size, two decidedly shrunk, without any marked thickening or rigidity.

*Aorta.*—Immediately above the valves there is a distinct dilatation towards the pulmonary artery, forming a pouch about the size of a walnut, with a circular aperture one inch in diameter.

At the base of the aneurismal pouch the semilunar valves are shrunk.

The inner surface of the aneurism is smooth, with scarcely any perceptible degeneration; a thin film of coagulated fibrin lined the aneurism, the contents of which were fluid. From the upper end of the pouch the aorta assumes its natural dimensions, but on the inner surface there are up to the descending portion numerous patches of degeneration slightly raised and discoloured by imbibition; in the descending portion only a simple patch observed.

The situation of the aneurismal dilatation was such that when distended it projected inwards upon the orifice of the pulmonary artery, so as to diminish its size considerably. The septum between the sac and the pulmonary artery was so extremely thin as to make perforation imminent.

*Abdomen.*—Moderate amount of serous effusion in peritoneal sac.

*Stomach.*—Mucous-membrane much thickened and corrugated.

*Liver.*—Capsule opaque, substance flabby, and in the condition known as nutmeg-liver.

*Spleen* enlarged and pigmented, extremely soft.

*Kidneys* very much enlarged and congested, decomposition advancing.

*Dysentery.*—Six cases remained, 96 were admitted: total, 102. 24 were discharged to duty, 6 died, 63 were discharged the service, and 9 remained at the end of the year. With the exception of 2 from the Mediterranean, all the cases were from India. Dysentery.

It is hardly necessary to say that nine out of ten of the cases of dysentery admitted at Netley are of the gravest kind. The sufferers have been sent home either because they have been broken down by repeated attacks of acute dysentery, with resulting organic disease, or because of some serious hepatic or other complication hindering recovery in the climate where the disease was contracted. Nor is this all, the subjects of this disease are liable to the same disadvantages as those already described under the head of pneumonia, *i.e.*, to Remarks.

have their malady aggravated by arriving in England in cold and wet weather, without being sufficiently protected by suitable clothing.

Thus it happens that the young medical candidates for commissions in the medical departments of the various services have opportunities of seeing dysentery as it is rarely seen elsewhere in Great Britain, viz., in a stage as nearly as possible resembling its most acute form in hot and malarial climates. Yet death from uncomplicated dysentery is rare at Netley.

Our fatal cases are often found to present, *post-mortem*, one or more hepatic abscesses, or the intestines are found in a state of complete atrophy, with destruction of all glandular structures, a condition in which nutrition is impossible. 24 only out of the number treated in 1870 were discharged to duty, but a large proportion of those finally invalided left the house in fairly good health, although it would not have been either fair or advisable to continue them in the service with a liability to return to India; a certain portion also being time-expired men having a right to their discharge.

I have no hesitation in saying that in such a class of cases such results would have been impossible in days when mercurial treatment was the rule, and not, as now, the rare exception in India. Men have not now to struggle with the disease *plus* the remedy.

General Principles of Treatment.

Our first care in the management of dysentery, as we see it at Netley, whether in the sub-acute or chronic stage, is to examine narrowly for any signs of the scorbutic condition, a by no means rare complication. If this be not at once made the subject of careful treatment, all medication will be futile.

Diet: Importance of.

The next point is to put the patient on milk diet, as I have elsewhere pointed out, the most cardinal point in the treatment; adding such other liquid support as the urgency of the case demands, using stimulants, and more particularly alcoholic stimulants, with a sparing hand.

Sub-acute form.

If the case presents the sub-acute form, the patient passing bloody muco-sanguinolent stools with tormina, we at once administer ipecacuanha, as if the disease had just been contracted in India, and experience has taught us that this remedy may be given, contrary to what is sometimes taught, even when the debility of the patient is to all appearance extreme.

I call to mind the case of Lieutenant ———, who was landed at Netley from India, to all appearance dying from dysentery. The men who carried him into the house from the pier were so fearful of shaking the feeble remains of vitality out of his wasted form, that they three times rested the stretcher on the ground. At the time of his admission he was passing from 20 to 25 stools every night, and as many during the day. The first full dose of ipecacuanha, even under such apparently desperate circumstances, reduced the number to five, the second to the same number in 24 hours; in 48 hours all blood disappeared from the motions, and convalescence had commenced. So complete was this young officer's restoration to health that, meeting him a year after his discharge to duty at Portsmouth, he was much chagrined, because in the healthy looking youth standing before me with extended hands, I failed to recognize my old Netley patient, Lieutenant ———. Those who have served in our clinical wards will remember cases in which the power of ipecacuanha in full doses has been almost as striking. I would not have dwelt so much on this were it not for the fact that, however familiar practitioners in India are with the therapeutic effects of this invaluable remedy in acute dysentery, its usefulness in the sub-acute stage even in debilitated subjects is less known.

Experience has taught us at Netley that, whenever a patient is passing stools containing blood of a dysenteric character, mere debility does not forbid the administration of it in a full dose of 25 or 30 grains, and its repetition after an interval of 12 or 24 hours, if necessary, due care being taken in the interval to sustain the patient by nutriment adapted to his condition. I think it unnecessary to repeat what I have elsewhere written on the treatment of this disease in its more chronic form.

I have selected cases from our records as fair specimens of the more complicated forms, which are for the most part fatal.

*Dysentery.—Constitutional syphilis, highly developed cachexy, gummatous deposit in skull, extensive cicatricial loss of substance, and contractions in liver, spleen kidneys, extensive adhesions of capsule of the liver (perihepatitis), recent*

*gummatous deposits in liver, lardaceous degeneration of liver, spleen, kidneys, stomach, and small intestines.*

Private Bannon, 45th Regiment, age 27, completed years of service, seven. Said to have "no syphilitic history in the service," but was treated for "gonor- "rhœa, continued fever, ulcers, intermittent fever," rheumatism, acute and chronic, general debility, and lastly dysentery, from which he suffered on admission to Royal Victoria Hospital, Netley, on the 2nd June, 1870, died 6th July, 1870.

This man disembarked from the East Indies on the 2nd June, 1870, in a state of extreme debility and emaciation, passing stools not having the odour characteristic of that disease; his countenance haggard, eyes sunken, lips and tongue dry, pale, and glazed, pulse 120, temperature 97°, respiratory sounds on both sides feeble, slight crepitition under right clavicle, heart sounds weak and indistinct. (The patient so much debilitated that an exact physical examination was impossible.)

Abdomen distended and tympanitic, pain on pressure over the whole surface. Stools consist of mucus and shreds of exudative matter suspended in a thin reddish fluid, extremely offensive.

Almost constant vomiting, rendering nutrition almost impossible. On the 21st June feet became œdematous, and albumen was found in the urine; patient gradually sunk, and died on the 6th July.

*Post-mortem Inspection.*—Body extremely emaciated, cicatrix of bubo in both groins.

*Head.*—Base of skull of unusual thickness, increase in thickness of both outer and inner lables, cancellated structure reduced, on left occipital bone an extensive syphilitic deposit about 1 inch in diameter, and membranous exudation, about 3 inches in extent, between dura mater and base, considerable injection of the base, with partial absorption, the disease extending through very nearly the entire thickness of the base, a thin film of exudation on the corresponding outer surface, dura mater otherwise normal.

*Arachnoid* thin and transparent.

*Brain.*—Weight, 2 lbs. 13 ozs., large convolutions slightly flattened, consistence rather soft, no other deviation from the normal state. The syphilitic deposit of skull in no way affecting the brain.

*Tonsils.*—Left enlarged, fauces and pharynx very pale.

*Pleura.*—A few filamentous adhesions of left lung, more extensive adhesions between the diaphragm and base of right lung.

*Lungs.*—Both lungs anæmic, imperfectly collapsing; emphysema of anterior margin of both lungs.

Œdematous infiltration of posterior parts of upper and lower lobe of left lung, slight congestion of posterior part of right lung, base of latter almost deprived of air; weight of right lung, 1 lb. 3 ozs.; left, 1 lb. ½ oz.

*Heart.*—Small and firmly contracted, nodular thickening of free margin of mitral valves, semilunar valves of aorta normal, tricuspid valves shrunk and atrophied.

*Abdomen.*—Some effusion into peritoneal sac, firmly organized adhesions between cæcum and base of liver (the former drawn up), and between the spleen and colon, large firm filamentous adhesions between the surface of the liver and spleen and the diaphragm.

*Omentum.*—Shrivelled up and atrophied, colon throughout contracted, apparently thickened.

*Stomach.*—Mucous-membrane thickened, intense re-action with iodine at pyloric end, none in duodenum.

*Small Intestines.*—Lardaceous degeneration of mucous-membrane extending throughout the small intestine, re-action with iodine increasing throughout the lower parts, and extending almost uniformly over the whole surface, glandular elements not permanently effected.

*Colon.*—Mucous-membrane throughout thickened and more or less pigmented round the follicles.

Follicles throughout more or less changed, some enlarged, distended with transparent white jelly-like substance, others having apparently discharged their contents, leaving circular ulcers, the place of others is taken by cicatricial

depressions, especially in the sigmoid flexure; re-action with iodine throughout the large intestine confined to the follicles.

*Liver.*—Form very irregular, much decreased; weight, 4 lbs.; numerous extensive deep cicatricial depressions, occupying chiefly the lower margin of the right and the whole of the left lobe. The cicatrization and contraction are so considerable, and in so many places, as to give the liver the appearance of cirrhosis. The capsule over the cicatrices is invariably thickened, white, and transparent, and in every instance there is a central filamentous adhesion (more or less elongated) to the opposite layer of peritoneum. The affection of the capsule is confined in a remarkable manner to the depressed spots, the intervening portion being free, but slightly opaque.

On making a section through the right lobe of the liver, syphilitic deposits in every stage are seen, from a cicatricial contraction round a hard central point, to a large yellow gummatous deposit.

*Spleen* slightly enlarged; weight, 7 ozs., capsule thickened and opaque, ligumentous adhesions similar to those in the liver, substance firm, highly lardaceous, intense re-action with iodine.

*Kidneys.*—Both small, capsule slightly adherent, surface presenting a granular appearance, owing to shallow depressions, like those in liver and spleen, cortical substance of right kidney considerably reduced in thickness, firm, of a greyish glistening appearance; left kidney, both cortical and pyramidal portion atrophied, considerably reduced in size, a small cyst on periphery, no re-action with iodine.

*Remarks.*—I have selected this case because of the remarkable discrepancy between the soldier's medical history and the morbid appearance revealed *post-mortem.* It is distinctly stated that he had "no syphilitic history." We must, therefore, suppose, either that when under treatment for gonorrhœa he was in reality suffering from a true chancre in the urethra, or that he had contracted true syphilis prior to entering the army.

The case stands in our records as one of dysentery, yet the lesions of the great intestine do not point to death from such a cause, neither did this disease, the symptoms of which were prominent on admission, last long enough to account for the extensive lardaceous degeneration present. The death, although debited to dysentery, was, without doubt, due to the extensive degeneration of vital organs from syphilitic poisoning, and it is probable that the purging was not the purging of true dysentery at all, but that so often seen in the last stages of amyloid disease of the intestines.

*Dysentery probably following a small hepatic abscess, the cicatrix of which was found post-mortem.*

*Ulcers of colon in process of healing, death resulting from scorbutic diarrhœa contracted on voyage home.*

Private John White, 3rd Battalion Rifle Brigade, age 35; disease, dysentery; total duration of illness, 360 days; completed years of service, twelve; distinct syphilitic history, suffered from bronchitis, abscesses, gonorrhœa, three times from diarrhœa, hepatitis, dysentery; habits said to be temperate, conduct fair; admitted 7th July, died 19th July, 1870. History: Invalided from Dinapore for dysenteric diarrhœa (chronic dysentery), voyage lasted 98 days.

During greater part of the voyage *said to have been on salt rations.* On admission presented all the symptoms of scorbutic dysentery, emaciation extreme, purpuric spots over his body, much abdominal tenderness, and marked pain on pressure in the region of the liver, passing 16 and 18 stools during the day; fluid, frothy, offensive, urine of low spc. gravity, no albumen, alkaline, debility extreme. In a few days his abdomen became tympanitic, his breathing difficult, his limbs œdematous, and abdomen filled with fluid.

He died on the morning of the 19th July.

*Post-mortem Examination. — Body.* — Much emaciated, œdema of lower extremities, right arm and right thigh show distinct marks of purpura.

*Head.*—Dura mater inordinately distended, structure normal. *Arachnoid:* diffuse opacity over the whole inner surface. *Pia mater:* vascularity slightly increased, sinuses of dura mater filled with thin liquid blood. *Brain:* weight, 3 lbs. 5¾ ozs.; brain voluminous, convolutions well developed, structure throughout soft.

*Chest.*—Hydropic effusion in both pleural cavities; lungs, both slightly compressed, substance anæmic, dry; structure natural.

*Pericardium.*—Slight hydropic effusion in pericardium, otherwise normal.

*Heart.*—Form natural, full sized, structure flabby, ralaxed, muscular walls rather thin, cavities large, containing liquid blood; diffuse opacity of endocardium in left ventricle, mitral valves atrophied, endocardium of right ventricle normal, semilunar valves of aorta atrophied.

*Abdomen.*—Hydropic effusion in peritoneal cavity; stomach, mucous-membrane thickened, no reaction with iodine, mucous-membrane of duodenum and ilium pale throughout, showing a moderate degree of catarrhal swelling, with increased mucous secretion. No prominent effusion of glands. No reaction with iodine, mesenteric glands very slightly enlarged.

Large intestines slightly thickened throughout, meso-colon and appendix loaded with fat.

Throughout the colon the mucous-membrane is extensively diseased, chronic dysenteric process in various forms and stages. Cæcum and descending colon are almost entirely deprived of mucous-membrane, the inner wall being formed in large patches by the macerated, shreddy, and disintegrated muscular coat; the ulceration extends over the whole circumference; there is no thickening, no exudation, no pus, no injection; an atonic and atrophied condition, following on a phlegmonous attack. In transverse colon, sigmoid flexure, there are a few circumscribed ulcers remaining open, the base formed by healthy smooth muscular coat, the edges of mucous-membrane thin or slightly undermined, but the greater part of the surface is occupied by cicatrices of former ulcers, some large and confluent, quite healed, without thickening or contraction.

*Rectum.*—Mucous-membrane atrophied, anæmic. The softening of muscular coat in cæcum, and descending branch has proceeded so far as in several places to threaten perforation.

*Liver.*—Considerably enlarged; weight, 5 lbs. 8½ oz.; several large cicatricial depressions on outer and upper aspect of right lobe; beneath these depressions the substance of the liver is atrophied, and contracted to a depth of about half-an-inch. At the upper surface of the liver a deep depression, corresponding to which, about half-an-inch deep, there is a distinct development of cicatricial tissue, with puckering and drawing in of the surrounding substance, having all the appearance of a healed hepatic abscess.

The substance of the liver is very tumid and soft, and of a pale buff colour. The highest degree of fatty degeneration.

*Spleen.*—Flabby, corrugated, capsule slightly opaque, substance normal.

*Kidneys.*—Normal.

*Remarks.*—With reference to the remarks made above on scurvy as a serious complication in dysentery, this is a most important case. It appears, I think, from this man's history, that he had an attack of plegmonous dysentery, that the small hepatic abscess followed as a result.

When this man embarked for England his case was a hopeful one; but instead of being placed on hospital diet, he was fed on the ordinary salt rations. Scurvy, with purpura and scorbutic, diarrhœa followed, and the man died from exhaustion. In this case the history and the *post-mortem* record are in entire accord.

*Hepatic abscess, dysenteric history, repeated operations with the pneumatic aspirator of Dr. Dieulafoy, removal of 600 ozs. of pus.*

*Evidence on the effects of liver cell destruction on the amount of urea in the urine.*

Private John O'Keefe, age 31, 18th Hussars, service, home $\frac{7}{12}$, foreign $11\frac{5}{12}$. Invalided from Secunderabad, India, at which station he served three years.

*History.*—Embarked for India in August 1858; had good health until February 1869, when he contracted dysentery attributed to chill when lightly clothed on night-duty; was in hospital until March of the same year, when he returned to duty. In April he suffered a relapse, from which he recovered in a few days. In May he was admitted into hospital with acute hepatitis, and was under treatment for a month, returning to duty to all appearance well. Before the end of June he was in hospital again with a return of his hepatic

symptoms in an acute form, and was under treatment for five weeks, when he again returned to all but mounted duty, for which he was too weak. In December of the same year he was sent to the invalid depôt of Poonamallee, near Madras, and finally embarked for England on the 19th of that month.

On the passage home he had severe hepatic symptoms, with loss of flesh and strength, and was admitted into the Royal Victoria Hospital, Netley, on the 8th April, 1870. He remained in the convalescent division until the 17th May, when he was transferred to the medical division for treatment.

*State on Admission.*—Presents a sallow sickly appearance, and is emaciated; skin, and particularly the conjunctivæ, being slightly icteric.

*Chest.*—On a deep inspiration, the lower part of the right side is immovable; a line drawn from the nipple round to the spine would accurately cut off this portion.

The right chest, on percussion, is dull, particularly as high up as the angle of the scapula, and anteriorly from two inches below the ensiform cartilage to the level of the nipple; a distinct fulness of the right side is perceptible from the sixth rib downwards, and the left lobe of the liver can be plainly traced into the left hypochondrium. The swelling in the right hypochondrium is uniform and smooth; the right side shows an increase in size, by careful measurement, of two inches over the left.

Pulse 100, quick and irritable; respirations 25; temperature, morning 99°; skin harsh and dry, complains of want of appetite, gradual loss of flesh and strength, pain in the right hypochondrium, beginning below the ensiform cartilage, and extending backwards and outwards.

There is also pain in the right shoulder "of a very wearing kind," and at times very acute; has intervals of temporary ease and comfort; decubitus dorsal, or on the right side; "cannot rest with any comfort on the left." On the 15th June I was requested to examine this patient.

I found, in addition to the symptoms recorded above, that the fifth, sixth, and seventh ribs on the right side were prominent, and the whole side was enlarged, the swelling giving an obscure sense of fluctuation to the finger; the skin over the swelling was smooth, and veins were observed to ramify over the surface, extending downwards to the abdomen; temperature 99°, pulse 100, respiration 20, dry cough, pain in right shoulder, abscess of liver diagnosed, and operation proposed.

On the following day the temperature had risen to 100°, pulse 110, respiration 25.

On the 17th June, 16 ounces of tolerably healthy looking pus was drawn away from most prominent part of the swelling between the seventh and eighth ribs anteriorly, with the aspirator; great relief followed the operation, pain ceased, and temperature fell two degrees; general swelling of right side not much diminished. On the following day the temperature rose again to 100°, and as the swelling had been but little affected by the operation, it was repeated with the same instrument introduced two inches external to the first puncture, when 64 ounces were withdrawn.

Two hours after the operation the temperature fell to 98°, pulse 110, respiration 25, and the size of the side had diminished an inch and one-eighth.

Up to the 23rd of June the patient was, to all appearance, in an improved condition, took his food well, slept comfortably, had no night-sweats, no pain in side or shoulder, no cough, but the medical officer had for some nights observed a gradual rise in the temperature, and on this date it was observed to be 102° at morning visit, and, as the physical signs of pus in the liver were also present the aspirator was again used between the sixth and seventh ribs, about an inch anterior to a line drawn from the centre of the axilla. 62 ounces of purulent fluid were drawn off, 52 of which consisted of reddish frothy looking serum, the last ten being thick tenacious pus, quite inodorous.

The greatest relief followed the operation; the temperature, pulse, and respiration falling as before in a most remarkable manner.

It was noted that the patient expressed the utmost satisfaction, saying, "that the pain of the operation was only like the prick of a needle."

The patient continued in the same favourable condition until the 27th, when the temperature began to rise, in the evening reaching 100°. On the

29th, the operation was repeated, 19 ounces of reddish pus, free from odour, being drawn off. At evening visit the temperature was 98°, and the pulse had fallen 21 beats.

At morning visit on the 11th of July it was noted that the temperature had again risen to 99°, and the officer in charge recorded his fears "that pus "was again collecting." On the 14th the needle was again introduced and the aspirator was applied but no pus was obtained. On the 12th of August, the temperature having risen to 100°, 14 ounces of pus were removed.

*14th August.*—An attack of diarrhœa reported.

*17th August.*—Abscess again tapped and 14 ounces of matter drawn off.

*20th August.*—Complained of pain in right shoulder only.

*22nd August.*—19 ounces of matter removed from abscess.

*28th August.*—22 ounces removed; evening temperature continues high, varying from 100° to 103°.

*5th September.*—Six ounces of red serous fluid removed from right side.

*7th September.*—27 ounces of thin chocolate-coloured purulent fluid removed; operation gave the patient much relief.

*10th September.*—Night-sweats, pain in right side; bulging of right lower intercostal spaces, fluctuation detected, 25 ounces of sero-purulent fluid removed.

*12th September.*—Pain in hepatic region; perspiring; temperature (evening) rising; bulging of lower intercostal spaces; 38 ounces of fluid drawn off, relief followed.

*15th September.*—The usual symptoms of accumulation of pus being noticed, 64 ounces of matter were drawn off; towards the end of the operation the matter became thin and of a red colour.

*18th September.*—58 ounces removed, greater part of fluid purulent in character.

*21st September.*—37 ounces drawn off; there were several shreddy flakes in the last few ounces. Two ounces of dilute carbolic acid injected into the cavity of the abscess and afterwards withdrawn.

*23rd September.*—With much difficulty 13 ounces of thin red serous fluid were removed, the canula being constantly choked with shreds of what seemed to be the lining membrane of the abscess.

*24th September.*—Pain left side, very weak, much prostrated; surface covered with cold clammy perspiration.

*27th September.*—31 ounces of thin red serous fluid removed.

*28th September.*—58 ounces removed.

*29th September.*—46 ounces drawn off, towards latter end of operation, the fluid was stained yellow with bile.

*2nd October.*—30 ounces drawn off, fluid thin and of a dark colour.

*4th October.*—Expectorates about 1½ ounces of purulent matter, mixed with greenish fluid.

*5th October.*—Cough and purulent expectoration.

*6th October.*—Died at 6 A.M.

*Post Mortem Inspection.*—General surface of the body and subcutaneous fat of a yellow tinge.

Some œdema of both feet.

*Head.*—Dura mater tinged yellow, especially along the course of the vessels; slight sub-arachnoid effusion.

*Brain.*—Texture firm, superficial convolutions somewhat flattened on the left side. Fatty-like degenerations of the choroid plexus; some yellowish deposit in the optic thalami.

*Lungs.*—Extensive adhesions towards the apex of the *left* lung, which was somewhat congested but crepitant throughout, otherwise normal.

*Right Lung.*—Lower lobe greatly disorganized, texture infiltrated with pus, a communication through the diaphragm exists between the lung and the right lobe of the liver.

*Abdomen.*—Mucous membrane of the small intestines of a darkish grey colour, with some adherent mucus. Remains of old ulcerations in Peyer's patches. No reaction with iodine. Large intestines much congested, extreme atrophy of all the tissues, cicatrices of old ulcers in the sigmoid flexura of the colon.

*Liver.*—Nearly the whole of the right lobe excavated into one large cavity, which is lined by a dense membrane, bounded by hepatic tissue in a disorganized condition.

The left lobe contains numerous small abscesses scattered throughout its substance, and in the upper portion of the lobe a large cicatricial contraction, surrounded by hard nodules of a tough yellow deposit of long standing.

*Kidneys.*—Capsule not easily separated, embedded in fat, texture soft, cortical substance congested.*

*Hepatic Abscess.—Corporal William Williams, age 36, 20th Brigade, Royal Artillery. Last station, Cannamore, India. Admitted 3rd June,* 1870. *Was frequently in hospital at Cannamore in* 1869, *suffering from dyspeptic symptoms, diarrhœa, and subsequently dysentery.*

He appears to have been four times in hospital with dysenteric symptoms, which were latterly complicated with hepatitis. The symptoms were "pain "in the right side," with fulness in the hepatic region, tenderness on pressure, sympathetic pain in the shoulder, followed by jaundice, and bulging of the right side, with fever, loss of appetite, and emaciation.

It was feared that abscess of the liver had either formed or was impending; but under treatment the most urgent symptoms subsided. He was sent to England, embarking on the 2nd of March, 1870. By his own account he rallied on the voyage, so much so, that until the ship rounded the Cape of Good Hope, he was able to assist in the daily routine of work on board.

From that time, apparently after exposure to inclement weather, his old symptoms returned, "dysentery with pain in the right side."

On admission into the Royal Victoria Hospital he was much emaciated, very anæmic, and in a state of extreme debility, pulse 120, feeble, temperature 104° F.

Tongue red, raw-looking, dry. He had frequent fluid stools of a distinct dysenteric odour, muco-sanguineous, of a slate colour, and passed with straining and tenesmus.

There was pain in the right hypochondrium, increased on pressure; the liver extended downwards three inches below the false ribs, the left lobe extended into the corresponding hypochondrium, and in the right mammary region, the upper surface reached the lower margin of the fifth rib. On careful measurement the right side was an inch and a quarter larger than the left, the line being taken on both sides from the centre of the back over the eighth rib to the mesial line in front. The decubitus was on the right side, or the back, never on the left side. Under the use of fomentations, stupes, warm poultices to side and abdomen, ipecacuanha and opium injections, suitable diet and rest, the general symptoms somewhat improved, the purging was less frequent, blood ceased to appear in the motions; he slept better and took more food, and his temperature sometimes fell as low as 99°, below which it was never noted. In this state he continued until the end of June, when the hepatic symptoms became more marked, his temperature rose every evening to from 101° to 104°; he had distinct rigors, followed by night-sweats, without, however, any marked change in the right side or any evidence of fluctuation.

It was impossible to doubt that one or more deep-seated abscesses existed in the liver; the dysenteric history, followed by the hepatic symptoms above detailed, the high temperature, the rigors, the night-sweats, all pointed to such a conclusion.

Accordingly, after consultation with my colleague, Dr. Fyffe, I proceeded to search for the abscess with one of the small perforated needles of Dr. Dieulafoy's pneumatic aspirator. On introducing it below the cartilage of the eighth rib, an abscess containing nine ounces of thin pus was entered and emptied by the syringe.

Great relief followed the operation; his temperature fell.

On the 6th of July, as the patient's temperature had risen to 104°, as he

* For observations on the effect of liver cell destruction on the amount of urea in the urine, *vide* the remarks on this case after that of Corporal Williams.

was sweating profusely, and complaining of pain in the side, I again introduced the perforated needle in various directions in search of purulent matter, but without success. On the 8th the operation was repeated near the site of the first puncture, when two ounces were drawn off, the matter being free from odour. On the 11th, after the patient had passed a night of pain and restlessness, I found that he referred his uneasiness to a new point, viz., between the eighth and ninth ribs posteriorly; the needle was passed in this situation pretty deeply into the gland, and 19 ounces of dark red pus was drawn off by the syringe.

Without going into minute details it must suffice to add, that the operation was performed, in all, twelve times, the needle being introduced now anteriorly, now posteriorly, sometimes below the false ribs, sometimes in an intercostal space, according to the indications given.

In all, 122 ounces of purulent fluid were thus withdrawn, up to the 10th of September, when the patient sunk. No irritation followed any of the operations at the seat of puncture, no air was admitted from first to last, and the pus withdrawn at the last operation was as free from odour as at the first.

The medical treatment was conservative throughout; the utmost attention was directed to control the dysenteric symptoms, and spite of the terrible hepatic complication, it was remarkable that ipecacuanha, either by mouth or enema, sometimes in combination with opium, sometimes with quinine, exercised its almost specific power, permitrate of iron was often used with good effect, and the diet of the patient was, from first to last, adapted to his condition, having been nutritious and unirritating, while, at the same time, wine was given in sufficient quantities according to circumstances. The patient was a married soldier and no *post mortem* examination was allowed.

**Remarks.**

The two cases above given are among the most interesting and important in our records. Both had a distinct dysenteric history, one (Williams) was labouring under that disease on admission. In both, multiple abscesses were present and there is every reason to believe had a pyæmic origin. The quantity of pus taken by repeated operations from both was very great, amounting, as has been noted above, in O'Keefe's case to more than 600 ounces, and to 112½ in that of Williams.

Enormous destruction of liver tissue was revealed, *post mortem* in the case of O'Keefe, and had an opportunity offered to examine the body of the other patient, a similar condition would have been found, for although the operation was performed twelve times, the needle was seldom introduced at the same part of the organ, but at various parts according to physical indications. There were, at least, four separate abscesses, having no communication one with the other at the time of the earlier operations, but there is reason to believe that, before death, they had all coalesced into one or two great cavities.

Although the contents of the abscesses underwent many changes in colour and consistence, the pus drawn away at the last was as devoid of odour as at the first operation. This, without question, was due to the non-admission of air into the suppurating cavities.

The instrument used in all the operations was the pneumatic aspirator of Dr. Dieulafoy first applied to the treatment of hepatic abscesses at Netley.

There is still some difference of opinion among practitioners as to the best method of dealing surgically with abscesses of the liver. Some advocate immediate evacuation by trocar or bistoury as soon as the abscess is discovered without regard to the admission of air; others remembering that in a considerable proportion of cases the abscess is discharged by lung or bowel, and aware that the ultimate result of these natural modes of discharge is more encouraging than where a direct opening is made, are averse to surgical interference, having observed that, even where the purulent collection points to the surface it is better to allow nature to operate in her own way, which, as has been noticed and recorded by many authors, so far differs from that of the surgeon, that the abscess is never evacuated at once, but gradually by one or more small apertures through which the pus slowly drains away. As this aperture is rarely direct, and as the cavity contracts as the matter is discharged, little, if any, atmospheric air is admitted, as is proved by the often observed fact that the discharge in such cases remains free from any offensive smell to the last, while the reverse obtains where an opening is artificially made,

which not only discharges the abscess at once, but admits air freely into the cavity.

Others, again, pursue a middle course, evacuating the abscess by means of instruments that rid the patient at once of the pus, and yet exclude air from the cavity.

In the Army Medical Department Reports, vols. viii. and ix., I have advocated this method, and given some cases which appear to justify my preference. It would, I think, be difficult to find any cases less likely to do well by any method of treatment than the two given above. The dysenteric history, the existence of multiple abscesses, the length of time that elapsed between the formation of pus and the arrival of the men at Netley, the destruction of liver tissue consequent on this delay, with, in the case of Williams, the presence of dysenteric diarrhœa throughout the whole time he was under treatment, presented conditions most unfavourable to recovery. I feel certain that by no other method than the one adopted could the lives of the sufferers have been so long preserved.

If an attempt had been made to drain away the pus by the ordinary method in the case of Williams, at least four different apertures must have been kept open. My experience enables me to say, without hesitation, that had a free communication been established between the external air and four suppurating cavities, rapid and destructive sloughing would speedily have followed, whereas, in the case of O'Keefe, by the plan pursued, his life was preserved in tolerable comfort for nearly five months from the date of the first operation, and, in that of Williams, from the 3rd of June to the 10th of September.

The relief experienced after each operation was very great, at once the temperature fell, sometimes as much as 3° F, within an hour after the operation, this was particularly remarkable in O'Keefe, whose case was not complicated while under treatment at Netley, by dysentery or diarrhœa.

Apart altogether from other indications, such as swelling in the hepatic region, night-sweats, loss of appetite and pain, very marked always in the case of Williams, a rise of one, two, and even four degrees in the temperature, never failed to indicate the time for repeating the operation.

Far from objecting, the patients were always clamorous for relief by the exhausting syringe. Although the operation in both cases was done so often, and, although such large quantities of pus were removed, no external wound or mark was visible, beyond a red point here and there, every trace of which disappeared after death.

It is not, however, in such cases as the above that we can expect permanent relief from the use of such an instrument as the aspirator of Dr. Dieulafoy.

In the present state of knowledge, I fear we must admit that multiple abscess of the liver lies outside the domain of curative medicine. It is in simple abscesses, not of pyæmic origin, that I believe instruments of this kind will prove invaluable, in such a case, for example, as that of Johnson, recorded by me in the 9th vol. of the Army Medical Reports.

In cases of this kind the aspirator of Dr. Dieulafoy has been used in Madras, on my recommendation, and so much approved of that the Inspector-General of H.M. Indian Service there, has directed one to be supplied to all the large stations in that presidency.

As is well known, I have always been opposed to so-called "explorations" of the liver in the coarse manner practised in former years, but with the fine perforated needles furnished with the aspirator no possible harm can result from their use in search of an abscess.

As soon as the constitutional symptoms, *e.g.*, rigors, night-sweats, and persisting high temperature, indicate the formation of pus, the exhausting syringe can be applied, and the abscess evacuated without pain and without the admission of air.

The bit of elastic tubing which is interposed between the extremity of the syringe and the perforated needle is very advantageous, as it prevents that pressure in working the syringe which is much complained of when Bowditch's syringe is used.

In single abscesses, not the result of pyæmic infection, it will rarely happen that a second operation will be needed, for the cavity once emptied by the

syringe, will, in most cases, rapidly contract, and, as in the case of Johnson, will not again fill.*

There is one other point of great interest in connection with O Keefe's case which was thus referred to by Dr. Parkes in his second lecture on some points connected with the elimination of nitrogen from the human body, delivered before the College of Physicians in March, 1871:—

"Nearly 30 years ago, in India, I examined the urine in a number of cases "of hepatitis and hepatic abscess, and while I found that in some instances "there was abundance of urea, in others there was scarcely any, and, in some "it appeared to be wanting altogether. On looking further into this matter it "seemed to me that the cause of the difference was to be found in the amount "of suppuration.

"When this was excessive, so that the secreting substance of the liver was "almost entirely destroyed, the amount of urea was greatly lessened and, in a "degree proportioned to the extent to which the secreting surface of the liver "was destroyed by the abscess; and, on the contrary, when the liver was not "suppurating, but was actively congested and enlarged with, no doubt, very "rapidly secreting cells, the amount of urea, as well as that of uric acid, "seemed to be increased.

"The want, however, of accurate quantitative determinations, and, of late "years, the recognition of the necessity of estimating the amount of entering "nitrogen, which, of course, was not attended to 30 years ago, led me to "doubt the accuracy of my observations, which, indeed, had not been con-"firmed by any observer, but lately I have had another opportunity of more "accurately observing this point.

"A case of hepatic abscess (O'Keefe's) was under the care of my colleague, "Dr. Maclean, who kindly allowed me to examine the urine.

"An immense abscess occupied the whole of the right lobe, leaving only a "very narrow margin compressed by a tolerably thick cyst.

"The left lobe, also contained at the time of death (three months and a "half after my analysis) many abscesses, but some of these might have been "formed subsequent to my examination. The liver was punctured by the "exhausting syringe many times, and altogether more than 600 ounces of pus "were drawn off, and it is certain that a large portion of liver substance was "destroyed.

"After every operation he rallied wonderfully, and his appetite improved.

"During six days (three months and a half before his death, and when, of "course, there was more secreting liver substance than later) the urine was "collected carefully and analyzed. The daily nitrogen of his food was not "entirely determined by analysis, but was determined chiefly by calculation.

"After making a most liberal allowance for excess of calculation, the "daily nitrogen cannot be put lower than 192 grains, in fact it must have "been considerably more than this, but I have erred on the safe side.

"In six days he certainly received 1,152 grains of nitrogen. He passed by "the urine—as determined by burning with soda—lime during the six days "792 grains, leaving 360 grains, or nearly 40 per cent. to be accounted "for.

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* In an article on Suppurative Inflammation of the Liver, contributed by me to Dr. Russel Reynold's "System of Medicine," Vol. iii., which, although only just published (October, 1871), was written more than two years ago, I suggested that the method of dealing with suppurating cavities so long urged and practised by Professor Lister, might be applied to abscess of the liver. Since that suggestion was thrown out, Mr. Lister has much modified his method. This eminent surgeon no longer applies the carbolic acid oil, or solution, to the suppurating parts, but by means of a spray producer surrounds the abscess to be opened with a carbolic atmosphere, until the antiseptic dressings are applied. The process is repeated at every subsequent dressing, until the wound is closed. Thus all the advantages of a free exit to pus and the exclusion of so-called "putrefactive germs" are combined. I think the results obtained are so encouraging, that in any case like those recorded above, coming under my care, I am resolved to make trial of the method, hoping thus to avoid the ill effects of the irritation fever and high temperature which were such marked features in the cases of Williams and O'Keefe, during the accumulation of the pus after such operation.

"He had no diarrhœa, and allowing him the healthy bowel excretion of "25 grains daily, which would really be only given by a much larger diet, in "six days only 150 grains would thus pass out, leaving still 210 grains to be "accounted for.

"He was also feverish (temperature 100° at night), sometimes 102° and 103° "when the abscess was full, which ought to have increased the urea. Con- "sidering how completely the exit covers the entrance in health, the retention "of 210 grains of nitrogen in six days shows either that the growing pus cells "appropriated nitrogen, or that the interruption to the proper action of the "liver cells, hindered the formation of urea. The latter seems more probable "because subsequently, after several operations, when the liver cells and vessels "would be much less compressed, and, therefore, for the time would be able to "act, the urea increased in quantity considerably, though after each operation "there was no doubt a still more rapid growth of pus cells."

Referring further to the disappearance of urea in yellow atrophy of the liver, when sometimes every liver cell is smitten with a rapid atrophy or dissolution, Dr. Parkes sums up the pathological evidence on the effect of liver-cell destruction on the amount of urea in the words of Meissoner.

From all these observations it clearly proceeds, "that withering and de- "struction of the liver tissue is connected with an important diminution in the "formation of urea."

It is hardly necessary, after the above, to insist on the obvious fact, that not only will a careful examination of the amount of urea eliminated by the urine with the necessary precautions indicated above, be a great aid to diagnosis in doubtful cases, but will enable the careful physician not only to form some estimate of the amount of liver tissue destroyed, but, what is of more importance, to inform him whether, after operation, liver suppuration is still going on.

## APPENDIX No. VIII.

## REPORT OF CASES IN THE SURGICAL DIVISION OF THE ROYAL VICTORIA HOSPITAL, FOR THE YEAR 1870.

By Deputy Inspector-General T. Longmore, C.B., Professor of Military Surgery.

Number of Cases admitted, and their general results.

THE total number of cases admitted for observation and treatment during the year ending 31st December, 1870, was 581. As 101 cases remained under treatment from the previous year, the total number of cases treated during the year was 682. Of this total there were discharged, fit for duty, 195; discharged, unfit for further service, 449; transferred to other divisions of the hospital, or for re-admission under other diseases, 32; while 6 patients died. There remained 85 under treatment at the close of the year.

Diminution in Number of admissions during 1870.

Number of admissions in the nine previous years.

The number of admissions during 1870 into the surgical division, 581, was considerably below what it ordinarily used to be in the years preceding the present system of transport of invalids from India.

The number of admissions in 1861 was 1,438; in 1862, 1,106; in 1863, 968; in 1864, 1,038; in 1865, 1,110; in 1866, 864; in 1867, 788; in 1868, 888; in 1869, 802.

The diminution in the number of admissions during 1870, does not appear to be attributed to a corresponding diminution in the number of invalids admitted into the hospital at large.

Diminution in Number of admissions not due to diminished number of admissions into the Hospital generally.

The following are given to me as the numbers of admissions at Netley for each year since the hospital was opened, viz., from the 10th March, 1863, to the 31st December, 1870; in 1863, 3,567 patients; in 1864, 3,733; in 1865, 3,593; in 1866, 3,737; in 1867, 4,031; in 1868, 4,129; in 1869, 3,667; in 1870, 3,500. The average of the eight years would be 3,744 admissions, and it is rather curious that this average should have been so far approximately maintained as it was during the successive years in question. The total number of admissions into the hospital in the year 1870 was the least of the series, viz., 3,500; but there were only 67 more in 1863, when the number admitted into this surgical division was 968, and only 93 more in 1865, when the admissions into the surgical division were 1,110. The explanation rather seems to be that, when the invalids came by sailing vessels round the Cape, they arrived in comparatively small parties at a time, while the arrivals were separated by wider intervals throughout the year. Thus there was no difficulty in distributing the invalids at once on their arrival to any one of the divisions of the hospitals (in each of which sufficient vacant beds were available), according to the nature of their cases; all cases requiring surgical treatment, to the surgical division; those requiring medical treatment, to the medical division. But since the introduction of the large steam transports, and of the plan of conveyance of the principal part of the invalids from the East by the Overland route, the invalids have arrived in such large numbers together, and the arrivals have so quickly followed one another, that it has become necessary to distribute them wherever room could be found. Some patients who, under former circumstances, would have been sent into the surgical, have now, of necessity, had to be sent into the convalescent division; and from that division discharged either fit or unfit, as the case might be, as quickly as possible, to make room for fresh arrivals. In 1870, 467 patients arrived together on the 1st of February by the "Serapis;" on the 13th of the same month, 210 by the "Crocodile;" on the 6th of March, 407 by the "Serapis;" on the 9th April, 460 by the "Crocodile."

Probable explanation of the diminished number of admissions into the Surgical Division.

The great number of invalids arriving together has been even more marked during the present year, for 757 patients arrived in one day, viz., the 15th of

February; and these were followed by 514 on the 8th of April, 181 on the 15th of April, 462 on the 26th of May, and 132 on the 11th of June, making a total of 2,046 patients between the 15th of February and the last-named date. Moreover, other invalids, though in small numbers, arrived during these same periods at the hospital, coming by other routes. The facts just mentioned seem to explain how it has happened that a less number of admissions has taken place in the surgical division during the year 1870 than during several previous years. The total number of invalids arriving has not been less, nor the proportion of cases among them that would have been treated in the surgical division had room been available.

Principal Diseases treated.

The diseases which have proved to be of most interest or which have formed the chief proportions among the cases treated have been—secondary syphilis, cancer, local scrofulous affections, diseases of the eyes, fractures, and surgical operations.

Diseases which proved fatal.

Six deaths occurred—1 under pneumonia, 3 under scrofula, 2 under cancer.

I propose making some remarks under each of the classes of disease above-named.

Number of Cases admitted.

Secondary Syphilis.—One hundred and fifty-one cases have been admitted during the year, under the heading of secondary syphilis, and as 26 cases remained from the previous year, the total number treated has been 177. Of this number 118 were eventually found unfit for further service, and 59 were discharged fit for duty.

General Remarks.

No cases in the division exhibit such a variety of morbid manifestations, or tax the time and attention of surgeons and nurses as many of these cases do. They usually arrive after they have been long treated in regimental and other hospitals, not only for the primary sore, but also for its secondary effects properly so called; when indeed the latest manifestations of the specific poison have been fully developed. Not unfrequently, in addition to the specific constitutional disorder, the syphilitic cachexia, there are the effects of long residence in a tropical climate, perhaps habits of intemperance conducing to further lower the vital powers of the patient, and to increase the difficulties of the case.

Although in these advanced secondary cases every organ and structure of the body is more or less tainted with the influence of the specific poison, it is rare that the influence is not found to predominate in some particular tissues in each individual. The greater potency of the morbific influence, or perhaps it may be better said, the more marked exhibition of this influence, in certain structures as compared with others, is probably due to original peculiarities in the constitutions of the individuals affected, rather than to any differences in the virus itself. Local circumstances, climatic, hygienic, and others, appear undoubtedly occasionally to influence the particular form of primary ulcer resulting from infection, and also the characters of the secondary eruptions following it; but the peculiar phenomena met with in the tertiary lesions seem generally to be attributable to individual personal peculiarities. In some instances the secondary lesions are most marked in the cutaneous system, in others in the glandular system, in a third group in the osseous system, in a fourth in the articulations, in a fifth in the brain, or in some of the viscera of the chest and abdomen, according as the patients may have happened to have possessed a tuberculous, rheumatic, gouty, or other special diathesis, or have had a tendency to special visceral affections from previous disease or debility existing in the organs concerned. In some cases the special lesions above referred to may have yielded to treatment, and the patients appear to be cured so far as they are concerned, while still a condition of cachexia remains, probably from depraved digestion as one cause, which prevents the men from ever being again effective soldiers. I have in several former reports shown the proportionate numbers in which the different systems of the body are affected among the soldiers who are found unfit for further service on account of the tertiary results of syphilis, and have also noticed the leading special lesions met with in these affected systems.

Syphilitic bone affections, and the use of mercury.

It always happens that affections of the bones and periosteum characterize a large proportion of the cases admitted for syphilitic tertiary lesions. The experience at Netley does not confirm the belief, occasionally expressed by some persons, that the prevalence of periostitic and ostitic inflammation and its consequences is to be attributed to the administration of mercury as a remedy

for the cure of the primary sore. Judging from the histories sent with the patients to Netley, it appears that as many of the cases of consecutive syphilis in which nodes and ostitic pains exist have been treated in their earlier stages without mercury as have been treated with mercury. If mercury be given to such an extent as to destroy the general health, there can be no doubt that it will tend to seriously aggravate the consequences of the syphilitic lesions, but there is nothing to show that it will materially alter the nature of these lesions, or determine the development of other than those lesions to which the constitutional diathesis of the patient renders him prone. Moreover, experience in the wards shows that in these tertiary lesions, occasionally all remedies will fail to arrest the onward progress of the disease until mercury is administered, so that, as regards medicines, it is on the careful exhibition of this mineral, with iodide of potassium, due attention being given at the same time to maintain, as fully as possible, the nutrition of the patient, that the surgeon places chief reliance for the cure of the disease. This could hardly happen if the depraved condition which it is sought to remove were mainly due to mercury, the very remedy which is found most effectual in removing it.

Syphilitic bone affections and mercury.

Unfortunately it is not possible to state with precision in how many cases mercury has been given in the early stages of the disease, and in how many not. Thus, of the 177 cases treated during the year, the records show that 61 were treated before they came to Netley by mercury, 31 without mercury; but in 85 cases it could not be ascertained whether the mercurial or non-mercurial treatment had been adopted. Surgeon-Major Holloway, whose duty consists in making abstracts of the histories of the invalids as they are admitted into the division, and noting the information required for the final invaliding documents, informs me that in these 85 cases in which no record has been made on this topic, no information was furnished on the subject, either in the medical history sheets of the patients, or in the detailed medical histories sent with them from the stations whence they were invalided to England. The reply to question 8 in these latter documents, in which "full particulars of medical "treatment of case up to date of invaliding," are asked for, has been a general statement of "usual treatment," "ordinary remedies," or some analogous expression, which of course leaves the particular question as to the exhibition of mercury constitutionally or otherwise entirely in doubt.

Proportionate number of cases of Secondary Syphilis treated in their early stages by mercury.

I have on several former occasions furnished Tables showing the number of cases among those admitted into the surgical division for the consequences of syphilis, which had come from each of the principal foreign stations where troops had been quartered. The remarkable immunity of the West Indies, which was exhibited in those Tables as regards the contraction of primary syphilis, or at least syphilis leading to invaliding for its secondary or prolonged effects, a fact frequently commented upon, has been equally apparent this year. No one of the 177 cases came from the West Indies; the East Indies and the Cape of Good Hope have furnished the largest majority. On referring to the Tables furnished by me in the Annual Reports for the first five years of the present decade, when the number of troops quartered in the West Indies was far greater than at present, I find that in 1861, out of 141 cases of secondary syphilis treated at Netley, in no instance was the disease contracted in the West Indies; in 1862, out of 153 cases, none were contracted in the West Indies, but one patient, who had contracted the disease elsewhere, was invalided from that station; in 1863, out of 144 cases treated, none contracted the disease in the West Indies, but 2 were invalided for it from this station; in 1864, out of 178 cases, 1 contracted the disease in the West Indies, and 2 were invalided from there for it; in 1865, out of 196 cases treated, 3 had contracted the disease in the West Indies, and 5 were invalided from that station. Thus, out of a total of 812 patients invalided from foreign stations on account of consecutive syphilis, and admitted for treatment in the surgical division of the General Invalid Hospital, only 10 came from the West Indies, and of those 10 only 4 had contracted the disease at that station.

Stations from which men invalided for Secondary Syphilis come to Netley. Immunity of the West Indies in respect to Syphilis.

Although the mortality in this hospital among cases of secondary syphilis is not great, yet there can be little doubt that eventually, sooner or later, a fatal termination must occur from its effects in a large proportion. Nothing can exceed the pitiable condition in which some of the patients affected with the disease in its secondary forms drag on their existence. The pain, the debility, the

Prognosis in cases of Secondary Syphilis.

offensiveness of the discharge from the sores, the dispiriting effects of the continued fresh manifestations of the malady as fast as others disappear or become healed, the foul breath, the deformities which frequently result, all contribute to the misery of these patients. They seldom are able to find the relaxation, or to divert their thoughts from their sick condition, which most other patients labouring under chronic diseases are able to do. Still the disease when it is not complicated with some original constitutional defects or some superadded mischief, rather shows a tendency to wear itself out, though leaving its track strongly marked behind it, than to kill by its own progress as many other blood poison diseases do. But let such a patient be exposed to injury, healthy restorative action is rarely met with, or let him become the subject of an attack of some acute disease, and in the weak and vitiated state of his tissues his life is at once placed in danger.

The fatal case under the head of "pneumonia," which occurred in a debilitated patient, broken down by the effects of secondary syphilis, was an example of this latter observation:—

*Case* 1.—*Pneumonia supervening on Secondary Syphilis, inducing rapid Consolidation of the Lung, and terminating in death.*

Case 1.—Secondary Syphilis, Pneumonia, and fatal result.

The subject of this attack arrived at Netley from India early in the month of February 1870 (the 13th), and stated that he had suffered much from the cold on getting into the northern latitudes, and especially during the passage up the British Channel to Portsmouth. He came to Portsmouth by the troop ship "Crocodile."

Several of the invalids who arrived by this vessel, as well as by the preceding vessel the "Serapis," which arrived at Spithead at the end of January, contracted inflammation of the lungs, owing to the cold and inclement season, and the change from a tropical climate. It hardly seems probable, however, that in the present instance the attack was developed on board the troop-ship, although perhaps the seeds of it may have been laid there; for although he had some bronchitic cough among his other ailments on admission, it was not until 12 days after his arrival at Netley that signs of pneumonic inflammation were observed.

According to the history furnished with the patient, who was a private of the 20th Hussars, aged 32 years, of 11 years service, of which nearly nine years were passed in the East Indies, he had suffered from two distinct attacks of syphilis. The first occurred in 1862, the primary sore being followed by indurated bubo, secondary eruptions, and other constitutional disorders. He contracted syphilis a second time, in 1868, the primary affection being followed by papular eruption, ulcerations of the skin and fauces, and chronic orchitis. The ulcerations invaded nearly every superficial region of the body, both upper and lower extremities, the hips, shoulders, back, lips, &c. He had been constantly under treatment since the date of this second attack. According to the history given he had been frequently salivated after the first attack, and subsequently to the second attack had been treated with mercurial vapour baths.

When admitted into the Royal Victoria Hospital he was much emaciated, and presented a well marked syphilitic cachexia. The fingers of his left hand were contracted, and several of its metacarpal bones were in a necrosed condition. Some sequestra had exfoliated from this situation during the voyage to England. On both legs were several deep ulcers. Both testicles were enlarged. So far as the sores were concerned there was some improvement after his admission, but there was no change in his general condition, when, on February the 24th, he was seized almost suddenly with pain at the lower part of the right side, which stethoscopic examination and the ordinary indications showed to be due to pneumonia. The remedies employed included enveloping the chest with warm poultices, the usual diaphoretics, with stimulating support in the shape of strong beef-tea, eggs, brandy, &c., but no relief followed their use. The disease, though of an adynamic character, rapidly ran its course, inducing consolidation of the affected lung, and he died on the 4th day after the first signs of the inflammatory attack became manifest. The course of the disorder from the commencement to its close well illustrated how much the event of an attack of such a nature as occurred in this instance depends, not

upon the degree of the inflammatory excitement, but upon the amount of power of resistance possessed by the structures invaded by the inflammation. It also showed how rapidly consolidation takes place in such cases, probably owing to causes analogous to those which lead to a similar result in patients poisoned by malaria.

The following case, which was under treatment for seven months of the year 1870, though not terminating fatally till the early part of 1871, is worth notice. It is remarkable on account of the very slender thread on which the patient's life for some time depended, owing to the advanced state of disease which existed in the upper part of the cervical column.

*Case 2.—Caries of part of the Anterior Arch of the Atlas; of the Bodies of the Axis, third, and fourth Cervical Vertebræ; with exposure of the Dura Mater of the Spinal Cord, consequent on Syphilis.*

Case 2.—Tertiary Syphilis, extensive disease of the Atlas, Axis, and of the third and fourth Cervical Vertebræ.

Private H. G., aged 25 years, of seven years' service, contracted primary syphilis, in 1868, at Graham's Town, Cape of Good Hope. The secondary effects were chiefly manifested in the osseous and ligamentous structures. Constitutional deterioration gradually advanced, and ultimately he was invalided to England. He arrived at Netley on the 24th May, 1870. On admission the syphilitic cachexia was very strongly marked; he was emaciated, an old ulcer over the left ilium was connected with diseased bone, another led to the left os calcis, which was in a carious condition, while two other sores on the right shin exposd a portion of the tibia in a necrosed condition. Nodes, which had not yet softened down, were perceptible at various parts of the bones of the extremities. Under the use of codliver-oil, iodide of potassium, and careful feeding and nursing, the patient appeared for some time to improve; his appetite became better, his nocturnal pains diminished, and the granulating sores assumed a cleaner aspect. The caries of the bones before named, however, continued to advance.

Towards the end of the year, without any apparent special cause, the syphilitic influence appeared again to get a general ascendency, and the patient retrograded in all respects. At the beginning of January, periostitis of the left scapula appeared, followed by a gummatous swelling, abscess, and eventually exposure of dead bone. About the same time the patient complained a good deal of pain about the neck, and there was tenderness on tapping the spinous processes of the upper cervical vertebræ, or on gently striking the top of the head by the hand. The patient now had a peculiar aspect. When sitting partially up in bed, he had his face bent forwards. In all changes of posture he kept his face and neck constantly in a fixed condition, especially avoiding all such movements as rotation of the head on the spine, movement of the head backwards—in short, all movements involving action of the head upon the atlas and axis, and of the upper cervical bones. When requested to put himself into such a position that his throat might be examined, the head and cervical spine were still moved rigidly together; the spinal movements, in raising himself, being confined to the lower dorsal and lumbar vertebræ. There was also considerable dysphagia.

These symptoms preceded the appearance of ulceration at the back of the pharynx, an affection he had not laboured under while at Netley, although there may have been ulceration in this situation in the early history of the case. When an ulcer became visible in the pharynx, it rapidly spread by sloughing, leaving a deep opening in the soft parts. No exposed bone was perceptible. The progress of this local manifestation of the general disease seemed to show that it had taken the same course here as it had done in the tibial and other regions, viz., inflammation of periosteum and gummatous deposits over the bones preceding ulceration of the soft parts covering them; not pharyngeal ulceration preceding the disease of the vertebræ. The various local remedies employed effected no improvement. Early in the month of February (the 6th) the patient had some violent vomiting, and, from what was found afterwards at the post-mortem examination, it seemed remarkable that the patient should have escaped without fatal injury. No fresh symptoms of a marked character occurred after this date; the morbid changes

gradually advanced, the patient at the same time becoming increasingly weaker, until he died on March the 11th.

A post-mortem examination was made 48 hours after death. It is not necessary to detail the general appearances presented, but the state in which the upper part of the cervical portion of the spine was found was of much interest. The anterior aspect presented ulceration and absence of the natural coverings; the bodies of the first four vertebræ being quite exposed to view on removal of a quantity of thick fetid pus with which they were overlaid. On further examination, the whole of the right lateral half of the anterior arch of the atlas was found to be denuded of periosteum and roughened. The bodies of the axis, of the third vertebra, and the upper part of the body of the fourth, on their anterior aspects, were also denuded and roughened. Caries was advancing in the substance of the body of the fourth vertebra. There was no intervertebral substance between the axis and third vertebra, or between the third and fourth vertebræ; it had been absorbed, and only a few shreds remained. The dura-mater of the spinal cord was exposed in consequence of the loss of intervertebral substance. All trace of the anterior common ligament had disappeared between the axis and upper part of the fourth vertebra. The anterior occipito-atloid ligament had partially disappeared, as had also a great part of the interior atlo-axoid ligament. The transverse ligament appeared to be quite intact, thus preventing the atlas from gliding forward, and so far averting the threatened loss of life from compression of the spinal cord by its posterior arch. The lateral ligaments were also uninjured. No disease could be detected in the cord, though it shared the somewhat softened condition in which the brain was found. There was no anchylosis of the affected vertebræ. The surfaces of the several joints connected with the diseased part of the spine were evidently intact, for they could readily be made to perform their natural movements by manipulation. It was probably the sense of pain, or an instinctive perception of danger, that had made the patient keep the cervical spine so rigidly fixed as he was in the habit of doing. The diseased portion of the cervical column has been preserved for deposit in the pathological museum.*

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* *Case of Comminuted Fracture of the Atlas, and Dislocation of the Axis from Gunshot Injury.*

In connexion with the case described above, it may be interesting to furnish a description of a preparation in the Pathological Museum, at Netley, which well illustrates the very great amount of injury which may be tolerated for a considerable period in this situation without destruction of life, provided pressure upon the spinal cord is prevented. The preparation was sent some years ago by Dr. Dick, of the 12th Regiment, but has not hitherto been described in detail. It is one showing comminuted fracture of the atlas and dislocation of the axis, caused by a rifle bullet. The following are my notes of the nature of the injuries inflicted:—

*Condition of the Atlas.*—(*a*) *Anterior Arch.*—There is a comminuted fracture of this arch. Part of the tubercle has been carried away. The fractured surface of the portion of the tubercle which remains is irregular, sharply splintered, and contains in its meshes some small particles of lead, showing that this was the part of the bone struck directly by the bullet. A portion of bone at its lower margin is completely detached, and only held *in situ* by ligamentous tissue. The part of the anterior arch, between the remnant of the tubercle and the right superior articular surface has also been carried away. The right articular surface itself is denuded of cartilage, and roughened. The space between the two superior articular surfaces has been widened by forcible separation. (*b*.) *Posterior Arch.*—There is a single fracture of this arch, about midway between the spinal process and the left superior articular surface, with partial displacement. The larger right portion of the broken arch is displaced forwards to about one-half of the diameter of the broken surface, and trenches proportionably at this point upon the space of the spinal canal.

*Condition of the Axis.*—The axis is not fractured, but has been remarkably displaced. The transverse ligament of the atlas no longer embraces the neck of the odontoid process; there is a space of at least a quarter of an inch between them, with a fragment of bone wedged in this space. The odontoid process has been driven towards the left superior articular surface of the atlas. The right superior articular surface of the axis is completely separated from the opposite inferior articular surface

CANCER.—One of the two fatal cases under this heading presented many points of interest, and as the morbid growth removed from the patient has been preserved in the Pathological Museum, I forward a full report of it:—

*Case of Fungus Hæmatodes developed from the left Orbit; Extirpation; Return of the Disease after a Year's Interval, terminating fatally; without the Disease appearing in any other part of the body.*

Case of Fungus Hæmatodes.

The patient, a driver of the Royal Artillery, aged 32, of 12 years' service, born of healthy parents, seemed to have enjoyed good health until a few days after leaving England to proceed to India, in August 1865, when he experienced acute and lancinating pain about the left eye and eye brow, and adjoining portion of the forehead. He had not received any blow or injury; had never suffered from syphilis, and was not aware of any cause to which the pain could be attributed. There was no noticeable swelling; and at the time the pain, which came on suddenly, appeared the power of vision in the left eye was stated to be unimpaired. The pain continuing, the surgeon on board the ship in which he was a passenger made an incision on the conjunctival surface of the upper eyelid. The bleeding which followed the incision seemed to relieve the pain for a time, but it soon returned. Calomel was also given; this led to salivation, but without affording any relief. He noticed after this time that his sight was gradually disappearing; it became weaker and weaker, until it was altogether lost.

He landed in India towards the end of December 1865. The pain had continued throughout the voyage but towards its termination had assumed more of a throbbing character, instead of the darting character, which it at first had. He was quite blind in the left eye on reaching India. He went to Lucknow, but shortly after his arrival there, was sent as an invalid to a hill station. There he remained one year, and at the end of that time returned to his former quarter. In January 1867, at Lucknow, a small tumour was for

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of the atlas to which it belonged, and is fully exposed within the breach made by the fracture of the anterior arch of the atlas. The outer margin of this exposed articular surface of the axis has been forced against the adjoining edge of the broken arch of the atlas, and is tightly fixed, impacted in fact, within the breach between the broken and partially separated portions of the atlas.

*Spinal Canal.*—Though slightly curtailed in dimensions, from the partial advance of one of the fractured ends of the posterior arch of the atlas, this canal and its membranes have not been otherwise materially interfered with; but in consequence of the fracture, loss of substance, and separation of the fractured ends of the anterior arch of the atlas, together with the impaction of part of the axis between them, the size of the two parts into which the atlas is divided by the transverse ligament is the reverse of what happens in the normal condition of the bone. The anterior divison is much the larger, the posterior division the more contracted, in size.

*After-results of the Injury.*—The odontoid process, part of the anterior arch, and part of the exposed right superior articular surface of the axis are eroded by caries.

*Remarks.*—This very interesting preparation was sent without any account of the symptoms during life, or of those which attended the fatal termination of the case; nor have I, after inquiry, been able to obtain any part of them. The bullet, a conical one, entered the face by the side of the nose on the left side, and a short time afterwards fell into the mouth, and was so expelled. The man, a private of the 12th Regiment, was wounded on the 3rd of December, 1854, and did not die till the 2nd of January, 1855, having survived the injury, therefore, 30 days after the date of its infliction. While under treatment in hospital, the patient complained of severe pains behind the jaw, on the right side, and called attention to a hard body at the back of the throat, which he wished to have removed. This supposed foreign body must have been the remaining fractured end of the anterior arch of the atlas.

The preservation of life in this instance, so long as it was preserved, was manifestly due to the impaction of the axis within the broken portions of the anterior arch of the atlas. The axis with the broken atlas would have otherwise inevitably compressed the spinal cord, and produced instant death. I am not aware that any instance of life being preserved by such an accident, after an injury of this portion of the spine, is on record.—T. L.

the first time observed protruding from the lower and inner side of the globe of the left eye. This tumour slowly increased in size, inducing much pain, and causing protusion of the eyeball. It was not interfered with, and in the early part of the next year had gained a very large size. According to the description of the patient, it was about the size of two fists placed together. In March 1868, the remains of the eyeball and the morbid growth were extirpated. The lachrymal gland was also removed.

After this operation the pain ceased, the patient gained strength and general health rapidly; and before the end of a month he was discharged from hospital apparently cured.

He now rejoined his battery, and from April 1868 until May 1869, he continued with it doing his ordinary duty. At this latter date he noticed a swelling within the orbit towards its outer side. It was soft, accompanied by pain, and when first observed was about the size of a walnut.

This tumour increased in size until the 12th of January, 1870, when he was invalided home to England. During the voyage homewards there was a good deal of bleeding from the growth, but the flow of blood was each time checked by the application of the perchloride of iron. The pain increased in severity during this period.

He was admitted into the Royal Victoria Hospital on the 25th of May, 1870.

On admission at Netley, the patient was very cachetic and emaciated. A large fungoid mass protruded from the left orbit, and depended upon the cheek.

It was excavated, and sloughing at its most dependent portion. A thin enorous fluid of offensive odour was discharged from the tumour, and also from the left nostril. The tumour measured from above downwards over its central portion 8½ inches, from the left nostril to the left ear, across its most prominent part, 11 inches. It projected forward 2½ inches from the cheek on the nasal side, 5½ inches from the tragus of the left ear on the outer side. The patient complained of very severe throbbing pain about the growth, shooting up to the forehead and temple, and extending downwards to the left shoulder. This pain varied from time to time in intensity, sometimes being most excruciating. The vision of the right eye was unaffected.

The treatment employed at Netley was chiefly directed to supporting the patient's strength, and easing his pain by subcutaneous morphia injections. Carbolic acid lotion and other disinfectants were employed for neutralizing the offensive odour of the discharges, and perchloride of iron, alum, &c., for checking the hæmorrhage which occurred from time to time, both from the tumour direct, and indirectly from the left nostril. Blood and some of the discharges unavoidably found their way to the pharynx and œsophagus, and produced nausea and dyspepsia of a very obstinate and distressing character. The constant sickness and rejection of food added greatly to the debilitating effects of the disease. Under it, and the occasional loss of blood, the general circulation became more and more enfeebled, anasarca of the lower extremities appeared, and eventually he sank on the 17th of July, 1870. At the time of the patient's death the fungous tumour covered the whole of the left side of the face, from the supraorbital region above, nearly to the edge of the horizontal ramus of the lower jaw below, while it was bounded laterally by the left nostril and left ear. The lower part of the tumour was moveable, but it was held firmly above, as it was also round its circumference by the distended livid skin which formed its margin. The central portion was broken down and excavated.

The following description of the tumour, which is preserved in the Pathological Museum, at Netley, written by Dr. Wearne, assistant professor of pathology, is taken from the "Pathological Register." No disease of an analogous kind was found in any of the other structures or organs of the body.

*Description of Tumour (Fungus Hæmatodes), removed from Driver H. H., Royal Artillery.*

Fungus Hæmatodes.

The tumour, presented externally, was a large outgrowth of morbid structure, occupying the left side of the face. The base was broad and firm, attached to the position of the left orbit.

Description of the growth.

The tumour expanded as a sprouting fungous mass from the base, overlapping the skin of the face, from the supra-orbital region to the angle of the mouth, and laterally from the nose to the ear.

The base and outer part of the tumour was covered by thin livid skin; the central part presented a tuberculated fungus and ulcerating surface of a dark colour. Transversely across the middle was a deep fissure extending downwards, $2\frac{1}{2}$ inches in extent, to the level of the face. The dimensions of the tumour were—in breadth, 5 inches; from above downwards, 4 inches.

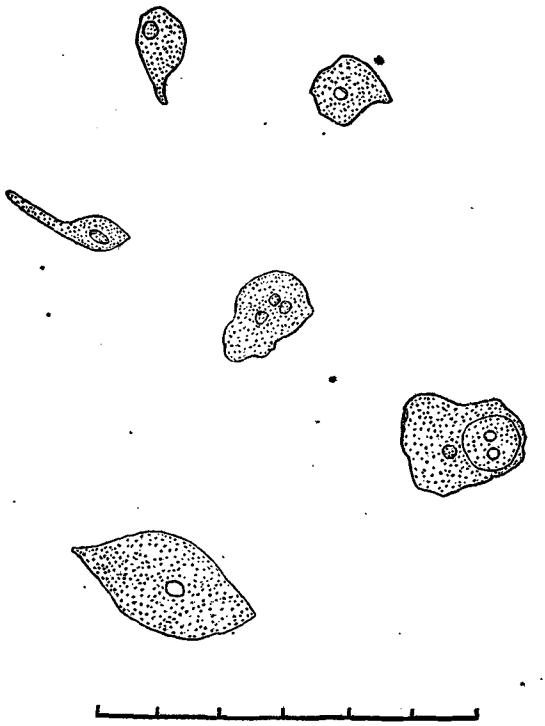
The deep connexions of the tumour involved the bones forming the anterior and middle fossæ of the cranium, and some bones of the face on the left side. The morbid growth appears to have invaded the cavity of the cranium through the sphenoidal fissure, and consequently to have firmly attached itself to the bones of the anterior and middle fossæ on the left side, separating the dura-mater from the bones. In the anterior fossa the morbid growth extended between the dura-mater and the bone, as far forwards as the vertical portion of the frontal bone. The orbital plate of the frontal bone, and the lesser wing of the sphenoid, were absorbed near the sphenoidal fissure; the anterior portion of the roof of the orbit was in process of absorption. The dura-mater of this portion was adherent to the tumour, but was not materially altered. The middle fossa (left) of the cranium was in great part filled up with the growth of the tumour. The morbid material occupied the whole surface of the bones forming the fossa, internally filling up the cavity of the sella turcica, externally attached to the squamous portion of the temporal at its junction with the parietal bone, causing some absorption (ulceration) of the bone, and following the course of the middle meningeal arteries, marked by ulceration of the bone and exostitic growth. Posteriorly it stopped its progress at the superior border of the temporal bone.

The dura-mater covered the invading growth, and was not perforated excepting at one situation, near the sphenoidal fissure. Here the morbid growth had penetrated through the dura-mater and arachnoid, and a rounded black mass, 2 inches by $1\frac{1}{2}$ inches, was adherent to the middle lobe of the brain. The morbid mass did not extend into the brain substance, but the contiguous portion of the brain was much softened.

The left optic nerve rested upon the morbid growth, and at its exit from the cranium, was pressed upon by it, and its course was through the growth at the optic foramen. The left optic nerve was smaller than the right, which latterly barely escaped from being pressed upon by the invading growth.

Tracing the course of the tumour downward, the morbid growth occupied the orbit (its probable starting point), thence downward had filled up the cavity of the antrum of the left superior maxilla; had caused absorption of its palatine process, and of the horizontal plate of the palate bone; and had then projected into the mouth as a tumour of the size of a hen's egg. This tumour presented a dark, sloughing surface, extending from the bicuspid teeth backwards to the soft palate. The alveolar process of the superior maxilla was absorbed in the region of the molar teeth, and these teeth were almost separated from the jaw. The upper part of the ramus of the inferior maxillary bone was involved in the destruction, together with the adjoining portion of the superior maxilla.

The colour of the tumour was dark—nearly black in some situations where it presented externally. The surface was irregular, sloughing and ulcerating, very soft and vascular. At the base of the brain the tumour was firm; it was melanoid on section Under the microscope it was composed of a fibrous stroma, containing cells of various sizes and of irregular shape—round, caudate, polygonal, and elongated cells, with large and many nuclei, all containing pigment, in fine molecular form; many cells being dark—nearly black, giving the melanotic appearance to the structure of the tumour. The cells varied in size from about $\frac{1}{300}$ to $\frac{1}{1000}$ of an inch.



$\frac{1}{1000}$″ × 330.

*Remarks.*—There are several points of interest in connexion with this case. It affords another example of this malignant disease affecting a special part of the body without any evidence being afforded of its existence elsewhere, notwithstanding that some years had elapsed since the local manifestations had been actively apparent. The observation of such a fact when it occurs naturally leads to an inquiry as to the nature and origin of the disease; how far it is to be regarded as a local disease, and how far constitutional. Further questions in this case are in what particular tissue of the orbit it originated, and to what immediately exciting cause was its development due? That fungus hæmatodes is not usually a mere local disease is sufficiently obvious from general observation of it; the frequency with which it is met with in a variety of organs at the same time, the general disorder which pervades the system of the individual at the time when the local affection is first made manifest, and the pertinacity with which it generally re-appears after apparently complete removal. But in the present instance the history shows that there was no general disorder of the system when the disease first indicated its presence, and this I have known in other instances of the disease, and the evidence after death showed that the only extension of the disease was to structures directly connected with the particular part in which it first appeared. The malignancy of character of the disease was sufficiently shown by its return, after a year's interval of freedom from it, subsequent to extirpation of all the diseased growth that was visible by surgical operation.

It must be concluded, I think, that in this and other similar cases, the disease, in the shape of parent cells, still exists in some of the tissues not removed in the operative proceeding—that the morbid cell-seed, as it were, remains dormant in these tissues as it probably had been lying dormant from birth in the tissues in which it first appeared, and that it is equally again excited

into action by some particular, but inappreciable and unknown cause, as it had been previously excited into development in the locality in which the morbid growth first showed itself.

It is difficult to determine in what tissue of the orbit the disease originated. There are many reasons to conclude that it did not commence in the eye-ball itself. In fungus hæmatodes of the eye-ball, the sight disappears before any change of structure is perceptible, agreeing with what has been demonstrated by Professor Virchow, that it usually has its origin in the connective tissue of the retina; the advance of the diseased growth and its consequences are visible through the cornea and pupil; the pain is severest at a later period, after the tissues have become distended by the diseased mass; finally, the tunics of the globe give way, and form an opening through which the fungous growth protrudes.

In the present case the progress of the disease was altogether different. The man stated positively that the sight was still retained when he first suffered acute pain about the orbit and forehead; and, according to the history, the protrusion of the morbid growth was first noticed external to and on the side of the eye-ball.

The dissection of the tumour and of its extensions confirmed this view. It probably was first developed in the periosteum of the orbit. The acute and lancinating pain about the eye-ball and orbit would point to a situation of origin somewhere near the sphenoidal fissure—at least, the history shows that the ophthalmic division of the fifth nerve was implicated in the disease before the optic nerve became involved. The fact of the disease originating in the periosteum of the orbit might account for the marked destruction of the bony walls of the orbit, and in a great measure explain the course taken by the morbid growth after it had extended itself from this cavity, and had entered that of the cranium, as subsequently demonstated at the post-mortem inspection.

One feature of interest which particularly struck myself at the post-mortem examination was the condition of the optic nerves of the two eyes. The optic nerve on the diseased side was shrunken, of a tawny yellow colour, and semi-transparent; and this condition continued close up to the commissure, and then almost abruptly ceased. The optic nerve of the other eye, the commissure, and two optic tracts, presented nothing abnormal; they were entirely healthy in appearance and consistence. The state of the optic nerve on the diseased side I considered to be one of atrophy, brought on by pressure, and not induced by disease within its own structure. Dr. Wearne was unable to discover in it any cells analogous to the cells pervading the diseased mass. This is an additional point of evidence in favour of the disease orginating externally to the organ of sight. It also explains how the vision of the right eye remained unaffected. The nerve fibres, by which connection had previously been established between the left and right optic nerves, between the former and the optic tract on the same side, and with the opposite thalamus, were all wasted; but the decussating nerve fibres of the right optic nerve, and the inter-cerebral fibres were in no way interfered with, either by disease or pressure, and thus the power of vision remained intact on this side.

General Remarks.

Local Scrofulous Affections.—Thirty-eight diseases and injuries in which a strumous origin was more or less marked were treated during the year, two of them eventually terminating fatally. A third fatal case was included under the head "Scrofula," because it was diagnosed to be of a scrofulous nature when first admitted; it proved, however, to be cystic. It is one of the particular characters of the condition of constitution designated Scrofula, that the slightest injury is liable to lead to the development of grave disease. In many cases a moderate strain of ligaments, or a slight blow upon a bone, is sufficient to set up morbid processes in a scrofulous subject, which eventuate in total disorganization of an articulation, or the death of the shaft of a bone. No doubt in many cases of grave scrofulous disease the injury in which the disease has originated has been of so apparently trifling a character that, even if noticed at the moment of the occurrence, it has been soon forgotten, and thus the mischief comes to be defined as entirely idiopathic. In one of the two patients noticed above as having died under this heading the fatal result appeared to owe its commencement even to a simple attack of gonorrhœa, occurring in a patient with a constitution of strumous tendency.

*Case 1.—Spinal Caries and Lumbar Abscess; escape of Matter by the Obturator and Sacro-Sciatic Foramina; Death.*

Scrofulous Diseases: Case 1.

The patient in this case, a gunner of the Royal Artillery, was invalided from Malta for lumbar abscess. On tracing out the history of the disease, the sequence of events may be briefly summed up as follows:—Gonorrhœa; orchitis, which became chronic; abscess of testicle; debility from long confinement in bed and continuance in hospital; inflammation leading to caries of the lower dorsal and upper lumbar vertebræ; abscess, the pus following the course of the great nerves downwards into the pelvis, and escaping in front, directed by the obturator nerve, through the left obturator foramen, and escaping behind, directed by the lumbo-sacral cord and sciatic nerves, through the sacrosciatic foramen below the pyriformis muscle; hectic; emaciation; bed-sores, &c.; diarrhœa; exhaustion; death.

There had been no local strain nor other injury, nor was there any history of syphilis. The symptoms which accompanied this train of morbid conditions need not be described; they were the same as are commonly met with in all such cases. The disease was already advanced when the patient was admitted into hospital at Netley on the 26th of June, 1869. There was at that time a copious discharge of pus from the opening on the inner aspect of the left thigh, below Poupart's ligament, as well as from the opening in the right gluteal region; and rigidity of the spine with angular curvature of the lower dorsal vertebræ. The pain on any movement of the patient was extreme, though there was not much tenderness apparent on tapping the spine. The hamstring muscles had become rigid from the patient's habit of lying on his back, with the knees flexed and the thighs raised towards the abdomen, evidently with the view of keeping the psoas muscles in a relaxed state. Although the patient suffered from frequent nausea, and had a very capricious appetite, and notwithstanding the copiousness of the purulent discharges, he maintained ground tolerably well until the end of November, when diarrhœa set in, probably to some extent of a pyæmic origin. This complication prevailed throughout the month of December, and he died exhausted on the 6th of January, 1870.

Post-Mortem Inspection.

Inspection post-mortem exhibited a state of very extensive disease of the spine, and several points of interest were elicited, especially in regard to the course taken by the matter proceeding from the lumbar abscess, and to the psoas muscle not being implicated in it.

The following is extracted from the notes made at the post-mortem examination:—

*Inspection of Spine, &c.*—"On the right side of the bodies of the two lowest dorsal and two uppermost lumbar vertebræ, all of which are diseased, is a large sinus through which a probe passes to the extent of 7 or 8 inches downwards, towards the position of the great sacro-sciatic notch. Beneath the crest of the ilium, on the right side, is the cicatrix of a healed sinus.

"An opening exists at the inner side of the femoral artery in the upper part "of the left thigh, through which a probe passes downwards in several direc- "tions, one being towards the obturator foramen. The left kidney has been "displaced upwards, and in the situation formerly occupied by it, is a large "fluctuating, oval swelling; this tumour is connected above with the bodies "of the lower dorsal and upper lumbar vertebræ. On section it contains a "large quantity of grumous, discoloured pus, and, on tracing its course down- "wards, is found to have several communications; one with a sinus leading to "the obturator foramen, another with a sac, globular in form situated above the "psoas muscle on the right side, but not communicating with the structure "of the muscle. These sacs of fluid proceed from diseased vertebræ, and "from the sacro-iliac sychondrosis. The bones entering into this latter joint "present exfoliation on their inner surface. The bodies of the affected "vertebræ are considerably carious and eroded. The part of the spinal cord, "in relation with the diseased vertebræ, is much injected. The great sciatic "nerve on the left side is roughened; its sheath much injected with blood. "The left psoas muscle is hardened and atrophied. Its sheath is entire."

*Case 2.—Spinal Disease after Typhoid Fever; Partial Recovery.*

In the following case, had the patient been of a more strumous diathesis, it is not improbable that lumbar abscess would have been induced by the debility and the effects of long confinement in bed, consequent on an attack of typhoid fever. The patient, a young private of the 52nd Regiment, aged 21 years, contracted typhoid fever at Malta, from which he recovered, though much weakened by the attack. Bed-sores on the sacrum, shoulders, and elbow, resulted from pressure during his confinement to bed. But one of the most prominent symptoms was severe pain in the lower part of the back, with so much tenderness on pressure being exerted upon the lumbar vertebræ, that the formation of lumbar abscess was suspected. No abscess appeared, however, and he was invalided to England for general debilty. When admitted at Netley, though still weak, he was found to be well proportioned and fairly nourished. The bed-sores were quite cicatrised. There was some limitation of movement and stiffness in the lower thoracic and lumbar regions of the spine, some pain on stooping, and some slight tenderness on pressure of the left side of the lower vertebræ. The spinous processes of the lower thoracic vertebræ were much thickened, probably from periostic inflammation. The patient was admitted at Netley on the 18th of February, and, owing to the impaired functional power of the lower part of the spine, was discharged as unfit for further service on the 18th of the following month.

Scrofulous Diseases: Case 2.

*Case 3.—Spinal Abscess, evacuated in the Lumbar Region; Pus Gravitating toward the Sacro-Sciatic Notch on each side; Fatal Termination.*

The second fatal case was one of lumbar abscess, in which no injury was known to have occurred, though very probably some such cause really started the disease at its commencement. It was stated in the medical history which accompanied the patient that he had suffered from primary syphilis, but, as no secondary symptoms had followed this primary sore, there can be little doubt that the sore was really a non-infecting one, and not true syphilis. Case 3.

The first symptom of the fatal disease was pain in the left loin, in April 1869, when the patient, a young corporal of the 83rd Regiment, aged 22 years, of somewhat phthisical aspect, was stationed at Gibraltar. Shortly afterwards a swelling appeared at the seat of pain. This was incised, and a large quantity of matter was evacuated. A purulent discharge continued from this opening up to the time of the patient's death. When admitted at Netley on the 19th of July, 1869, all the usual signs were present indicative of the abscess being connected with diseased vertebræ. Subsequently ascites appeared, and had to be relieved by paracentesis. The lumbar disease ran through its ordinary course, inducing, as accompaniments, great nausea, frequent diarrhœa, constantly increasing emaciation and debility, night sweats, &c. Latterly hectic and diarrhœa constantly prevailed. Death resulted from exhaustion on the 21st of January, 1870.

At the post-mortem examination the sac of a large abscess was exposed over the bodies of the lumbar vertebræ, all of which were denuded and eroded. The abscess was prolonged on both sides into the cavity of the pelvis, proceeding in each case towards the sacro-sciatic notch. Both lungs were consolidated, their texture being infiltrated with minute miliary deposits. In the left lung there were scattered isolated nodules of tubercular matter in process of softening; while in the right lung, at its apex, there was a small cavity containing some inspissated tubercle. This patient had a supplementary spleen; it was small —about the size of a marble.

The pointing and early free opening of the abscess in the left lumbar region in this case had evidently prevented abscess openings from being formed in the more dependent positions towards which the matter was found to have been gravitating, the pus apparently following, in its course downwards, as in the preceding fatal case of lumbar abscess, the direction given to it by the lumbo-sacral cord and great sciatic nerve.

*Case 4.—Extensive Multiple Cystic Disease of the Neck, at first simulating Cervical Adenitis, followed by development of Cystic Growths in the Pharynx, left Hip, and Pelvis, terminating in Death.*

Case 4.—Cystic Disease.

The third fatal case under scrofula was one of much interest, as, although placed under the heading of scrofula when first admitted, the disease proved to be cystic in its nature. The patient, a private of the 81st Foot, aged 18 years, stated to be of quiet temperate habits, was invalided from Gibraltar under scrofula, and admitted into Netley on the 6th of August, 1870. Swelling, supposed to be of the glands of the neck, first manifested itself in March of the same year, and was attributed to the effects of cold, acting on a strumous constitution, from the patient sleeping in a wet tent, when his regiment was encamped at Windmill Hill.

When he entered the Royal Victoria Hospital there were large tumours in the region of the cervical glands on the left side of the neck, as well as in that of the parotid gland on the same side. They extended from the ear and mastoid process to the clavicle, and from the parotid to the nape of the neck. On the surfaces of these tumours were several small openings, from which a thin purulent discharge exuded. There were no swellings on the right side of the neck, although several glands on this side were said to have been enlarged at the commencement of his illness. The patient's aspect was strumous, he was spare in frame, and his general health appeared to be broken down, but no visceral organic disease could be detected. He complained of what appeared to be rheumatic pains in the left hip, but no physical indications of disease could be found in this situation at that time.

The cystic character of the disease in the neck showed itself, while the patient was under treatment. Fresh enlargements in the region of the cervical glands repeatedly, and sometimes quickly, occurred. On puncturing one of these swellings, a yellow serous fluid would escape, while a swelling close adjoining would be unaffected by the evacuation. Fresh cysts appeared, or old ones became repeatedly re-filled The fluid was examined by the microscope for any traces of hydatids, but none could be found, neither hooklets nor shreds of their investing membranes were visible. There were, however, large corpuscles whose nature could not be determined, in addition to innumerable transparent cells. The fluid had a specific gravity of 1·017, and consisted almost entirely of albumen, congealing at the boiling point into a solid white mass, which was insoluble in nitric acid.

Injections of iodine, free incision and plugging some of the cyst-sacs with lint soaked in solution of chloride of zinc—1 part in 30, and the other remedies which were employed, produced no beneficial effect on the tumours. The pain in the left hip increased, pain in the knee on the same side became added, and no relief was produced by blistering, by liniments, or any other external local applications. Subcutaneous injections of morphia alone eased the pain.

Towards the end of October swelling appeared about the left hip and upper part of the left thigh, the tumefaction presenting an uniform rounded contour. The cause of the swelling was below the fascia, and evidently lay very deeply. Tenderness was complained of on pressure over the joint.

On the 21st of October the circumference of the upper part of the left thigh was nearly 5 inches in excess of that of the corresponding part of the right thigh, the measurements being—left side, 20¼ inches; right side, 15½ inches. There was no lengthening or shortening of the affected limb.

On the 12th of November, the swelling about the left hip and thigh was observed to have become very quickly considerably increased. On inserting a small trocar into the tumour, fluid appeared of the same character as that obtained from the swellings in the neck, and 16 ounces of this fluid were then drawn off.

On the 24th of November a tumour was observed in the left hypogastric and pubic regions. It appeared round and firm, and much tenderness was complained of on pressure. Pain on micturition was also now complained of. On examining the tumour per rectum distinct fluctuation was felt when the abdomen was tapped.

As the disease advanced, cachexia became more marked, and he lost flesh. Eventually he became worn out by the continuation of excessive secretions from the cysts, and of the pain produced by the pressure of the morbid growths on important parts of the economy. He died on the 28th of November, 1870.

*Appearances presented on Examination after Death.*—The post-mortem examination fully unfolded the true nature of the disease. Cystic formations were found in various parts of the body, but more especially about the cervical region, pelvis, and hip. They appeared to be growths quite independent of the glandular structure.

The disease was strongly marked externally on the *left side of the neck* and cheek, where it had obtained an enormous size. From the ear to the clavicle on this side there was a mass of cysts, variable in size, lying beneath the platysma myoides. The left carotid artery took its course among dense connective tissue behind the cysts. Their contents were chiefly fluid of a purulent character; the original secretion of the cysts being partly transformed by inflammatory action, induced through the surgical treatment adopted for their obliteration.

The early connexions of these cystic growths were no longer traceable, but they appeared to be quite independent of the lymphatic glands, which were, however, found to be much enlarged.

On the *right side of the neck* was an unopened cyst, about the size of a turkey's egg. Like the cysts on the left side of the neck, it was situated below the platysma myoides, and occupied a space from an inch and a-half below the ear to an inch and a-half above the clavicle. It was lying among the deep muscles of the neck, and projected about three-quarters of an inch behind the larynx.

This growth was in two lobules. Its walls were very delicate, smooth, and thin. The pressure of the cysts on the two sides of the neck, especially of the growths on the left side, had induced considerable œdema of the pharyngeal and laryngeal mucous-membrane.

Behind the *left tonsil* numerous small growths of dense texture were formed, exhibiting cystic cavities; each growth was of about the size of a barley-corn.

The cavities of the *pelvis*, and of the *left iliac fossa*, were occupied by morbid growth, of a lobulated character, and composed of large masses of cystic development. The adjacent viscera were compressed by this tumour. The bladder was pushed across to the right side, being pressed upon anteriorly and on the left side by the cystic growth. The cysts were situated beneath the peritoneum. They did not present any connexions of an intimate nature.

The large cystic mass surrounding the *left hip* was found to be in close connexion with the capsule of the articulation, and to extend to the intertrochanteric line of the femur. It had eroded the bone in various places, and was in progress of disorganizing the structures composing the interior of the hip-joint. Cretifications, in the form of small plates, were present in the walls of the cysts in this region.

Remarks. The Surgeon under whose observation the case first came was led by his examination of the cervical swellings, several of which appear to have shown themselves at the same time, to diagnose that it was the chain of lymphatic glands on that side of the neck, which was affected. The difficulty of forming an exact diagnosis of the disease has been remarked upon by observers, even in children, in whom its occurrence is less rare.

Mr. Cæsar Hawkins, in a paper "On a peculiar form of Congenital Tumour "of the Neck," in vol. 22, of the "Medico-Chirurgical Transactions," speaks of the occasional difficulty in the diagnosis of cystic disease in its early condition, when remarking on the case of a child suffering from a tumour of the neck which he had the opportunity of subjecting to post-mortem inspection. In this instance the disease was found to be composed of a multitude of small cysts, "Many hundreds probably, varying in size from a pea to a walnut, "closely joined together, and composed of delicate membranes, like very fine "peritoneum, but in some parts covered by fibrous structure, giving the cysts "the appearance of thin pericardium, and very few of them were so far insu-"lated as to admit of being dissected out without cutting through others. The fluid in most of the cysts was transparent," &c. Regarding the diagnosis, Mr. Hawkins remarks: "The number of cysts existing in the tumour, and

"the different degress of consistence of the whole or of separate parts in "different cases, arising, as the dissection demonstrates, from the size and state "of tension, and relative position of individual cysts, make the diagnosis of "the tumour somewhat obscure. When numerous and full of liquid, and "small in size, they feel like enlarged glands, or other solid globular bodies. ". . . The resemblance to fatty tumours is considerable." (Op. Cit. p. 240). Mr. Hawkins, in his paper, referred more particularly to cystic tumours as they are found in infancy.

Mr. Liston has mentioned in his work on "Practical Surgery,"* a case in his hospital practice in which a cystic tumour in the neck was mistaken for a fatty tumour. The patient, a man in middle life, applied for relief on account of a soft elastic lobulated mass, which filled completely the space above the right clavicle. Being taken for a steatomatous growth, it was cut down upon with a view to its extirpation. An ounce or more of serum issued at the first incision. Mr. Liston's account goes on to say that the dissection was pursued, and six or eight other distinct sacs adherent to each other were gradually exposed and extracted. The case went on well, and a cure resulted. Certainly in the instance of the patient at Netley no one, either from its appearance or from palpation, would have diagnosed the tumour of the neck to be a fatty tumour; but it was not until the evidence was afforded by evacuating the contents of some of the cysts that its true character was determined. The situation of the tumour at a part where large strumous glandular swellings are not unfrequently found, the history sent with the patient, his strumous aspect, the solid character of the swelling presented to the sense of touch, and there being an entire absence of anything like fluctuation, all led to his being placed under "scrofula" on his first admission at Netley. There was general induration of all the tissues surrounding and overlying the tumour, while from the three or four openings in its surface there exuded a sero-purulent discharge, and these might well have been the conditions in a case of adenitis of long standing, in which some glands had suppurated, and had been opened for the evacution of matter. Directly, however, that a trocar and canula were inserted into a fresh swelling, and the clear serous fluid which followed was observed, the nature of the disease was seen to be either hydatid or cystic; and the further examination of the fluid by the microscope and chemical tests sufficiently indicated that it was cystic. As to the particular tissues in which the disease was developed, the early history of the case might have led to the supposition that the cystic growth was due to the dilatation of natural ducts of some of the lymphatic glands of the neck, but the subsequent progress of the case, and the appearances presented after death preclude this hypothesis. Although on the left side of the neck, where the disease first made its appearance, the relation of the various structures exposed to view were rendered very obscure owing to the intimate matting together of the tissues resulting from the long-continued inflammation and suppuration, there were yet some lymphatic glands which were obviously not involved in the morbid growths, though themselves enlarged from irritation. On the left side of the neck the solitary cyst, which formed a true *hydrocele of the neck*, as it has been designated, could be clearly seen to have no connection with the lymphatic glands of this region, and the cystic disease deeply placed in the femoral region showed still more its independence of any lymphatic gland origin. The examination of the disease as it existed in all the various situations already described, led to the conclusion that it originated and was developed in the connective tissue; and this is the same conclusion that Mr. Hawkins came to with regard to the congenital cysts described in his paper.

A question might arise as to when the disease first appeared—whether it started into existence about the time when it was first noticed, or whether it had previously been present, though in a less prominent form. The history, especially the appearances which led to the supposition of the chain of lymphatic glands of the neck being affected, separates the case from the category of cases of "hydrocele of the neck," in which the cyst is usually single, and of congenital origin. The patient in this case had been healthy, as far as observation could tell, prior to the appearance of this disease. He had five years'

* "Practical Surgery," by Robert Liston, 4th Edition. London, 1843.

service in the army. Had any noticeable departure from a state of health been apparent when he enlisted it would in all probability have attracted attention at the time of his examination as a recruit; nor could anything like an enlargement about the neck have failed to attract notice in a soldier habitually wearing uniform. Had there been any special congenital tendency to the disease, the irritation of the closed collar of the man's uniform coat might well have been sufficient to excite it into action, as it sometimes does excite adenitis in this region when there is a constitutional predisposition. I allude to this, as the frequency with which congenital cystic tumours have been met with in the neck has been frequently noticed by surgeons. At the same time, the cystic growths were not a mere local affection, as is sufficiently evidenced by their development in parts remote from the original place of their appearance, about the hip and the pelvis. The amount of predisposition to the disease, and the existing causes which led to its development, can be little more than matters of conjecture in the present instance.

Opthalmia.

DISEASES OF THE EYES.—It may be worth mentioning that the cases of admission under opthalmia have notably diminished during the last few years. There were only 39 cases admitted during the year 1870, while I find on reference to the annual returns, furnished by me during the early years of the present decade, that in 1861, 328; in 1862, 230; in 1863, 266; in 1864, 233; in 1865, 205; in 1866, 126 cases of ophthalmia were admitted for treatment in the surgical division. In 1867 the number of admissions under this head was reduced to 79, but in 1868 it was raised to 97, the Abyssinian expedition causing some increase among the cases of ophthalmia. In 1869 the number fell again to 72. As before mentioned, during 1870, the admissions for ophthalmia were only 39 in number. I can only attribute this diminution in the number of cases of ophthalmia leading to patients being invalided from foreign stations, and still requiring treatment on arrival in England, to there being maintained a better hygienic state of the barracks abroad in which the troops are quartered, compared with the condition which existed in former years. These are not cases that would pass into the convalescent division; however great the demand for accommodation, all such cases come to the surgical division for treatment. Moreover, the 39 cases admitted during 1870 were generally of a mild character, often cases of catarrhal ophthalmia contracted during the voyage home among men who had been invalided for other diseases. Nearly all the cases of granular ophthalmia admitted during the year 1870 came from Japan, and some of these were severe.

General Remarks. Gradual diminution in the number of admissions under this heading since the year 1861. This diminution probably illustrative of improved hygienic state of barracks.

Of other eye affections impairing vision, diseases of the inner tunics, imperfections of sight depending upon refractive defects, cataracts, and the results of injuries, there were altogether 52 cases. One case of amaurosis in which vision was seriously impaired in both eyes in a trooper of the 4th Hussars, was produced suddenly by the kick of a horse upon the occiput. The lesion was evidently central and either due to the effects of direct cerebral concussion, or of indirect from contrecoup, probably the latter. There was a transverse depression in the occipital bone, so that fracture, at any rate, of the outer table, had been produced by the blow from the iron shoe. The man suffered from frequent cephalalgia chiefly in the forehead, and from general nervous agitation, but the impaired power of sight was the result of the injury which led to his being discharged from further service. In another case of injury, permanent diplopia followed a blow on the eyebrow from a splinter struck from a piece of wood which the man was chopping; while in a third a blow of a similar kind seemed to have led to the formation of cataract.

Deep-seated diseases of the Eyes.

In two or three instances injuries upon the globe of the eye had led to rupture and total destruction of the organ. Seven patients were rendered unfit for further service from occlusion of the pupil following iritis. This result might probably have been prevented had the use of atropine been resorted to in the treatment.

Of refractive defects 3 were cases of hypermetropia, 11 were cases of extreme myopia. There can be little doubt that Europeans who are highly myopic, run much risk by service in a tropical climate, more particularly when duty or voluntary occupation leads them to be employed in "fine "work"—that is, work which necessitates a strain of the accommodatory

Eye: Defects of refraction.

function of the eye. Thus, myopic persons engaged in much writing, especially if the writing be in small characters, such as colour-serjeants often employed in preparing "states" on small cards, filling up pay accounts, &c., or persons devoted to fine drawing, under the light of a tropical sun, are very liable to have their degrees of myopia increased. High degrees of myopia are very frequently associated with posterior staphyloma; and, though under moderate employment of this organ in a comparatively dull light such as exists in England, life may be passed without much inconvenience from the existence of this condition when the condition is corrected by appropriate lenses, the over-stimulation of tropical light, and the effects of straining the eye by close work, usually soon lead to the staphyloma becoming seriously aggravated, and, with it, of course, the amount of myopia. But it entails more serious consequences than this even, if the exposure and strain of the staphylomatous and weakened organ be continued; disseminate choroiditis; retinal changes inducing loss of sensitiveness or amblyopia, sometimes going on to atrophic changes, are undoubtedly brought about from this cause. A myopic person whose myopia depends upon a staphylomatous condition of the eye posteriorly should always regard his eye as a weak organ; and, therefore, should protect it as much as possible from strong glare, especially from close work under strong light. The use of blue-tinted glasses affords the best protection from the effects of strong Indian light to officers and other persons whose circumstances admit of their obtaining them; but non-commissioned officers and soldiers, independent of the unfitness which a high degree of shortsightedness entails as regards their duties as riflemen, should never be sent to tropical climates, owing to the danger of their myopic condition becoming greatly increased, if not of worse consequences being produced by exposure to the sunlight of such countries. The numbers invalided for myopia are, however, considerably less than they used to be within my recollection, and no doubt this is due to the greater attention which is now given to the subject of ocular refractive disorders.

Myopia in India and other Tropical Climates.

General Remarks.

Fractures.—Twenty-four cases of fracture were admitted during the year in the surgical division, in some instances the patients being admitted for the direct effects of the fracture, but in others on account of morbid conditions, more or less associated with the fractures. There were 34 bones fractured in the 24 patients. The bones fractured were—occiput, 1; inferior maxilla, 1; humerus, 3; ulna, 3; radius, 5; metacarpus, 1; femur, 4; patella, 1; tibia, 6; fibula, 7; spine, 1; pelvis, 1.

As might be expected, the majority of these fractures occurred from accidental falls; but in some instances the origin of the fractures was simply a muscular effort, usually associated, however, with some cachectic condition of constitution. Two or three cases are interesting, from showing what very slight causes may lead to fracture of bone when the natural tenacity and firmness of its structure are lessened by some cachectic or depraved habit of body.

Examples of Fractures from very slight causes. Case 1.

In one of these, a patient who was under treatment for necrosis of the lower jaw, while standing in one of the corridors of the hospital, turned his body round suddenly to look in another direction, when he felt his right leg snap. He was chiefly resting on this leg at the time. The man at once fell, and when picked up and carried to his ward, the tibia and fibula of his injured leg were found to be both broken.

A sharp point of the tibia had nearly penetrated the skin. In this instance the weight of the body, in turning, acting on the leg (which, as far as known, was previously quite sound and healthy), as the fixed point, caused a fracture of the tibia. The fibula was probably broken in the act of falling.

There was very great difficulty in obtaining union in this case. The limb was put up in plaister of Paris bandage, and remained in it for about six weeks; but during this period no callus was thrown out, nor did any other sign of commencing ossific union show itself. All splints were now removed, and the limb placed on a pillow, the broken ends being occasionally rubbed against each other to excite action. Repair then gradually took place, and the man left the hospital with continuity of the broken bones restored. The pressure of the plaister of Paris had probably impeded the free circulation which was essential for repair in this case. The patient was a weakly man; he had

suffered from dysentery in India, and subsequently from fever at Malta; but there was no clear history of the cause of the necrosis of the lower jaw, which had commenced at Montreal about two years before he came to Netley. There was no history of syphilis, nor of the constitutional administration of mercury. He had not had any other bone of his body fractured.

In another patient, who was also under treatment for necrosis of the lower jaw, a fracture of the right humerus about the middle of the shaft, occurred while the man was at Netley, from the simple act of throwing a stone. In this patient also, a private of the 87th Regiment, of strumous appearance, there was no history of syphilis, nor of mercurialization. The man had suffered from repeated attacks of intermittent fever. Case 2.—Another case of Fracture from slight cause.

The immediate cause of the disease of the jaw appeared to be the effects of exposure from going, when acting as cook, from a heated cook-house into the cold atmosphere outside. Swelling and suppuration of cervical glands followed, the jaw-bone became involved, and eventually necrosis ensued. The malarial impregnation of a strumous constitution may have led to so slight a cause inducing such severe consequences. The bone which was broken at Netley gradually became united under ordinary treatment.

In a third instance the muscular effort was even less than in the two preceding instances, for the patient's arm snapped while he was merely buckling the straps of a comrade's knapsack, without using any unusual force. Case 3.

In this case the patient's constitution was affected by syphilitic cachexia The fracture occurred at Malta, and took place at the junction of the lower and middle third of the right humerus. The history sent with the patient stated that union took place quickly and firmly, but with considerable displacement, so that the arm remained weak and powerless. The man had been under treatment in hospital for pain in this arm of a rheumatic character just before the fracture occurred. The patient was found unfit for further service, not only on account of the effects of the fracture, but more especially from his cachectic condition due to the syhilitic taint.

Of the other patients treated for fractures in two the injuries were the result of explosions of gunpowder. One patient had his right patella fractured from the stroke of a stone while blasting rock for making roads at Dalhousie, in India. The patella was united with scarcely any perceptible interval between the bone fragments. The man was able to walk well unassisted by a stick on level ground; but he went up and downstairs with some difficulty. The injuries in the other case of explosion were severe, leading to the patient's arm, though preserved, being quite useless. The man, a gunner of the Royal Artillery, was engaged in firing a royal salute on the Queen's birthday, at Morar, in Bengal. Whilst acting as No. 2 at the gun, a 6-pounder, and ramming the charge home, the charge took fire. The result was a comminated fracture of both bones of the right forearm about the middle, extensive burn of the lower third of the arm and wrist, and a deep wound across the front part of the humeral region. When admitted into Netley this patient was found to have his fingers, hand, and wrist contracted and rigid; to have also the power of pronation and supination impeded by a considerable amount of new bone which had been thrown about the seat of fracture; and, lastly, the elbow firmly flexed nearly at a right angle, apparently the result of contraction of the biceps following the wound across the upper arm. The whole arm was so completely crippled, and so much an incumbrance, that there could be scarcely any doubt that amputation would have left a preferable condition. Cases of Fracture caused by Explosions of gunpowder.

Twenty-one bones had been fractured by falls from various heights. One patient, a gunner of the Royal Artillery, fell over the ramparts at Point de Galle, Ceylon, on a dark night, and sustained a simple fracture of the left femur at the junction of the upper and middle third, together with a fracture of both bones of the left forearm, near the wrist-joint. The fracture of the radius was simple, that of the ulna compound. Shortening to about two inches of the left lower extremity, and partial anchylosis of the left wrist-joint, rendered this patient unfit for further service. Cases of Fracture from falls

Another patient had a remarkable escape, having recovered from what was diagnosed at the time to be fracture of the spine in the lower dorsal region. The injury was caused by a fall from a cliff, about 30 feet high, in Adelaide, South Australia. The man was in an unconscious state when brought to

hospital, but recovered consciousness soon afterwards. The history sent with the patient stated that a marked antero-posterior curvature was detected in the lower dorsal and upper lumbar region of the spine; that there was paralysis of the lower extremities, paralysis of the bladder, and partial paralysis of the rectum. The natural power of the bladder and rectum were regained in five days, but power of motion and sensation returned slowly, and only partially, in the extremities. When admitted into Netley, the patient, though halting in his gait, was able to walk without assistance. A slight projection of the spinous process of the last dorsal vertebræ, with some little enlargement to its left side, were all that were noticeable at the seat of injury in the spine.

Cases of Fracture from blows.

One case of fracture of the occiput from the kick of a horse has been already referred to under the cases of cæcitas. One case of fracture of the lower jaw resulted from a kick by a man's foot; the fracture united.

Results of Fracture on Invaliding.

Out of the 24 invalids admitted or treated for fracture, only two were discharged fit for further service. The majority were rendered unfit by the effects of shortening or deformity; in some the causes of unfitness were complications, such as syphilitic cachexia, chronic bronchitis, defective vision. In two instances, already above referred to, necrosis of the lower jaw, the disease for which the patients were previously under treatment, formed the direct cause of unfitness.

The affections of bones, exclusive of fractures, were—necrosis, 7 cases; caries, 7 cases; scrofulous disease, 3; periostitis, 2; diseased vertebræ, 2; neuralgia of bone, 1; exostosis, 1; total, 23.

Surgical Operations.—As the greater number of the operations in the surgical division during the year 1870 and the three preceding years were performed by Surgeon-Major Mackinnon, C.B., that officer has undertaken to give an analytical digest of them and their results in a special report.

## APPENDIX No. IX.

## LIST OF THE OPERATIONS PERFORMED AT THE ROYAL VICTORIA HOSPITAL, NETLEY, DURING THE YEARS 1867, 1868, 1869, AND 1870.

With Short Abstracts of the more Important Cases.

By Staff-Surgeon Major MACKINNON, C.B.

### YEAR 1867.

| Operations. | | Number of Cases. | Disease. | Result. Duty. | Invalided. | Died. | Remarks. |
|---|---|---|---|---|---|---|---|
| Amputations | Thigh (lower third) ... | 1 | Contractura ... ... | ... | ... | 1 | *Vide* Case 1 in Detailed Account. |
| | Arm (upper) ... ... | 1 | Necrosis ... ... ... | ... | 1 | ... | *Vide* Case 2 in Detailed Account. |
| | Foot (Syme's) Parry's modification ... ... | 1 | Caries ... ... ... | ... | 1 | ... | *Vide* Case 3 in Detailed Account. |
| Radical Cure of Stricture | Internal Division ... | 2 | Strictura Urethræ ... | 2 | ... | ... | Average stay in Hospital after operation 18 days. |
| | Holt's Method ... ... | 8 | | 8 | ... | ... | Average stay in Hospital after operation 25·37 days. |
| | Thompson's Method ... | 8 | | 8 | ... | ... | Average stay in Hospital after operation 36·69 days. |
| Removal of Calculus | Lithotomy ... ... | 1 | Calculus Vesicæ ... ... | 1 | ... | ... | *Vide* Case 4 in Detailed Account. |
| On the Eye | Excision of Eye-ball ... | 1 | Cœcitas ... ... | 2 | ... | ... | ..... |
| | Tenotomy of Ex. Rectus | 2 | Strabismus Divergens ... | 2 | ... | ... | ..... |
| | Operation Staphyloma . | 1 | Ophthalmia ... ... | ... | 1 | ... | ..... |
| | Iridectomy ... ... | 4 | ,, ... ... ... | ... | 4 | ... | ..... |
| | Peritomy ... ... | 1 | ,, ... ... ... | ... | 1 | ... | ..... |
| Miscellaneous | Excision of Testicle ... | 3 | 1 Fungus Testis ... 2 Orchitis (N. G.) ... | 2 | 1 | ... | ..... |
| | Operation for Cure of Varicocele ... ... | 2 | Varicocele ... ... | 2 | ... | ... | Lee's method was used with needle and subcutaneous division of the spermatic veins. |
| | Tapping ... ... ... | 2 | Hydrocele ... ... | 1 | 1 | ... | ..... |
| | Division of Fistulæ ... | 4 | Fistula in Ano ... .. | 3 | ... | ... | ..... |
| | Excision of Epithelioma | 1 | Epithelioma Labii .. | ... | 1 | ... | ..... |
| | Removal of Sequestra... | 2 | Necrosis ... ... ... | ... | 2 | ... | ..... |
| | Removal of Hæmorrhoids... ... ... | 2 | Hæmorrhois ... ... | 1 | 1 | ... | Smith's clamp and cautery were used in these cases. |

ABSTRACTS.

*Case* 1.—*Amputation of Thigh (Lower Third).*

Sapper G. B., Royal Engineers, aged 35, admitted into Royal Victoria Hospital, Netley, October 30th, 1866.

On admission there was found to be considerable swelling of the left knee, together with great thickening of tissue round the joint. Two fistulous openings existed in connection with the joint, one at the upper, and the other at its lower part. These discharged pus pretty freely. There was also a fistula in connection with the left elbow-joint, which was much enlarged. This fistula had a healthy appearance, and seemed tending to heal. Patient was very thin, but his general health was pretty good. Little or no pain in the joints. He had been ten years in the service, and had enjoyed good health most of the time. He had had syphilis. His family history was distinctly phthisical; his father, mother, and one brother having died from consumption.

This illness began early in 1866, in Canada, as synovitis in both the above-mentioned joints. Abscess formed in their neighbourhood, and after being opened gave rise to the fistula.

For some time after admission into the Royal Victoria Hospital the limbs were kept at rest, the fistulæ were treated with simple stimulating lotions, and tonics, cod-liver oil, and nourishing diet were administered. This treatment was resorted to with a view to healing up the fistulæ, and saving the limbs by inducing anchylosis. Under this treatment he progressed favourably for several weeks, the fistula in the elbow healed entirely, and the swelling disappeared, leaving the joint somewhat stiff, but not anchylosed. The sinuses in connection with the knee-joint also showed a tendency to heal. There was, moreover, a marked improvement in his general health.

But about the middle of December he began to experience pain at the inner side of the knee-joint, and startings of the whole limb set in, being especially troublesome at night. The sinuses also took an unhealthy action. Soon an abscess formed at the seat of pain. This was opened, and a large quantity of pus evacuated. Other abscesses formed and were opened. His general health began to fail at the same time, and a constant drain on the system soon established a hectic condition.

As his constitution was so markedly affected, and there was evident disorganization of the joints, and as matters were daily getting worse, it was deemed advisable to remove the limb, and amputation was performed at the lower third of the thigh by the flap method on the 5th February, 1867. Examination of the joint after removal showed total denudation of the articular cartilages of both bones. The joint was filled with pus. The head of the tibia was quite soft, and full of pus and disentegrated bone tissue. There was also some amount of caries of the condyles of the femur.

There was considerable secondary hæmorrhage after the operation, which greatly reduced patient's strength before it could be arrested. It was principally general oozing of blood from the surface of the stump.

For three days after the operation he was in a very precarious condition. There was almost constant nausea, with frequent vomiting and hiccough. But these untoward symptoms were successfully combated with sedatives and repeated small doses of brandy.

After this he progressed favourably until the 15th day from the operation. During this period his strength had improved, and the stump had a healthy appearance, a considerable part of the flaps having united. There had been no night sweats. Pulse, however, had averaged 100, and the temperature 99·2° Fahr. At this date he had a severe rigor, followed by several less severe. His pulse was 140, and temperature 104·4° Fahr. Stump began to discharge very freely. He was ordered beef-tea and brandy every half hour. There was no pains in the other joints, or over the liver.

During the next three days his condition improved, his pulse came down to 101, and his temperature to 99·8° Fahr. He was ordered five grains of quinine three times a-day in an enema.

On the 18th day after operation he was delirious for a time. He began to feel intense pain in the left elbow-joint, which was observed to be much

swollen. Pulse 130, temperature 101·8° Fahr. He also was affected with dyspnœa, and there were signs of congestion of the lungs.

From this date till the 32nd day after operation he continued to get worse The dyspnœa became very great. There was great pain and uneasiness in most of the joints. The discharge from the stump gradually ceased. His temperature varied between 97° and 100° Fahr. He gradually sank into a comatose condition, and died on 9th March, 1867.

*Post-mortem Examination.*

*Brain.*—Membranes healthy. Substances anæmic, but firm. A small quantity of fluid in the ventricles.

*Chest.*—A good many old adhesions in left pleural cavity. Left lung in a state of grey hepatization. More recent adhesions in right pleural cavity, Right lung greatly congested at its base. There was an accumulation of pus on the left side of the thyroid cartilage. Heart enlarged. A good deal of fatty deposit on its surface, large clots in right auricle and ventricle.

*Liver* pale, and substance easily broken down, but no abscesses.

*Kidneys* congested.

Pus was found in the left shoulder and elbow-joints, also in right shoulder, wrist, and ankle-joints. The muscles in and near the stump were pale.

*Case.* 2.—*Amputation of Arm above Elbow.*

Private A. D., 97th Regiment, aged 30. This man was admitted into the Royal Victoria Hospital, Netley, May 9th, 1867, suffering from extensive necrosis of the bones of the right forearm. The forearm was perfectly riddled with sinuses, leading to exposed bone. There was also some disease of the external condyle of the humerus, with which a sinuses was connected.

He had been ten years in the service, and had been a man of temperate habits, and had during this time pretty good health. He had served in India, where he had an attack of ague once. Family history good. He attributed his condition to having about a year before accidentally run a small fork into his arm. From the date of this accident abscesses began to form in the forearm, and very soon it was manifest there was extensive disease of the bones. A variety of treatment had been tried, but without any good being effected. As there was no chance of saving a useful limb, and as the constitution was becoming rapidly undermined, it was decided to be best for the patient to have the limb removed.

On the 28th May, 1867, the arm was amputated about three inches above the condyles. The flap method by transfixion was the one used.

Some hours after the operation secondary hæmorrhage set in, which was arrested by the styptic colloid. On the second day after the operation secondary hæmorrhage again set in, which was arrested by graduated pressure. On the third day it again set in, and was pretty profuse. The flaps were opened, and a small artery ligatured. The surface of the flaps was brushed over with styptic colloid, and ice employed. This effectually arrested the hæmorrhage.

After this the case progressed slowly but favourably, and on the 60th day after operation the stump was perfectly healed. He was discharged the service on the 20th August, 1867.

*Case* 3.—*Amputation of the Foot by Mr. Parry's Modification of Syme's operation.*

Private R. H., 32nd Regiment, aged 35. This man was admitted into the Royal Victoria Hospital, Netley, December 29th, 1866, suffering from enlargement of the left testicle, which began four months before admission without any apparent exciting cause. The testicle was smoothly and uniformly enlarged. There was no pain, but an occasional feeling of weight was experienced in it. He had had syphilis two years before the commencement of the disease, and also had an attack of gonorrhœa. Under constitutional treatment with iodide of potassium and sarsaparilla, and local application of iodide of lead ointment, the swelling greatly diminished.

While in hospital, on the 1st March, 1867, he sprained his right ankle severely, and was confined to bed with it. Arnica lotions were applied, and cold douche, and in the course of a few days the great pain swelling, and ecchymosis disappeared, but some amount of stiffness and pain on movement remained.

In the course of a few weeks the joints swelled, and became extremely painful. There was also a good deal of starting in the limb at night. Then the outer part of the ankle became very red, and an abscess formed, which was opened. Soon eroded bone to a considerable extent could be felt at the bottom of the abscess. Patient's health began to fail, and other signs of caries of an extensive nature in the tarsal bones became manifest.

During the manifestation and progress of these symptoms the swelling in the testicle entirely disappeared.

As no hopes could be held out of saving the foot, amputation was considered the best for the patient under the circumstances, and accordingly was performed on 26th of June according to Deputy Inspector-General Parry's method, which is as follows:—

An incision having a slight convexity forwards was made, commencing at the prominence of the scaphoid and astragular articulation, three-quarters of an inch in front of the internal malleolus. This incision was carried across the hollow of the sole to the outer side of the foot, close to the external malleolus.

From this point it was prolonged upwards and backwards, with a slight curve to the back of the heel, terminating at the outer border of the tendo achilles at its junction with the calcaneum.

Connecting the extremities of this incision a second, having a slight forward convexity, was made, commencing at the internal extremity. It was carried across the instep, three-quarters of an inch in front of the articulation, and passing below the external malleolus, joined the outer extremity of the first incision.

A large flap, including the whole of the tissues of the heel, was thus made. It was carefully dissected off the bones, the plantar arteries being cut very low down. The tendo achilles and the lateral ligaments having next been divided, with great ease the joint was disarticulated. The ends of the malleoli were then sawn off, and the flap adjusted with sutures.

A well-rounded stump was obtained, including the whole of the tissues forming the natural pad of the heel, and having the plantar arteries cut very long, so that there was no danger of sloughing.

The advantages of this method of operation are that it is more easily performed, the difficulty of dissecting the thick tissues off the os calis being avoided. That it gives a better stump, more of the tissues of the heel being left than in any other method yet proposed; that there is very little danger of wounding the posterior tiblal artery; and, lastly, there is a very ready escape for the discharges, and hence the chances of bagging are avoided.

The advantages of this method of operation were well seen in this case. Nothing interfered with recovery, and patient was discharged with a good and useful stump on the 3rd November, 1867.

### *Case* 4.—*Lateral Lithotomy.*

Private J. H., 70th Regiment, aged 20. Admitted in the Royal Victoria Hospital, Netley, June 15th, 1867, suffering from calculus of the bladder.

The symptoms began three months before admission, and since then had gradually increased. On exploring with a sound a stone of considerable size could be felt. Two days after admission he passed a piece of calculus, which stuck in the orifice of the urethra, and had to be removed.

He had been a farm labourer before entering the Army, and up to the onset of the symptoms of calculus had always been healthy.

The lateral operation for lithotomy was performed on him on July 2, 1867, and a phosphatic calculus, about the size of a walnut, removed. A good deal of oozing of blood took place after the operation, which was with difficulty checked by plugging the wound.

For three months after the operation patient was in a very weak and debilitated condition, and the perinæl wound continued unhealed, the urine passing principally through it. There were also symptoms of great vesical irritation and catarrh. After this time he began to improve, though slowly. The opening in the perinæum did not close till the middle of January 1868, six months after the date of operation.

## YEAR 1868.

| Operations. | | Number of Cases. | Disease. | Result. Duty. | Invalided. | Died. | Remarks. |
|---|---|---|---|---|---|---|---|
| Amputations. | Thigh (Carden's method) | 2 | Synovitis ... ... ... | ... | 2 | | *Vide* Cases 1 & 3 in Detailed Account. |
| | Thigh (Spence's method) | 1 | Necrosis ... ... ... | ... | 1 | | *Vide* Case 2 in Detailed Account. |
| | Leg ... ... ... | 1 | Caries of tibia ... ... | ... | 1 | ... | *Vide* Case 4 |
| | Foot (Perry's modification ... ... ... | 1 | Arthritis chronic. . ... | ... | 1 | ... | *Vide* Case 5. |
| | Arm ... ... ... | 1 | Arthritis and necrosis ... | ... | 1 | ... | *Vide* Case 6. |
| | Fingers ... ... ... | 5 | Onychia (1) ... ... Necrosis (3) ... ... Anchylosis (1) ... ... | 1 | 4 | ... | *Vide* Case 7. |
| Excisions of Joints. | Elbow ... ... ... | 1 | Luxatura ... ... | ... | 1 | ... | *Vide* Case 11. |
| | Wrist (Lister's) ... ... | 1 | Caries ... ... ... | ... | 1 | ... | *Vide* Case 12. |
| Radical Cure of Stricture. | Holt's method ... ... | 9 | Strictura urethra ... | 9 | ... | | Average stay in hospital after operation, 31·1 days. |
| | Thompson's method ... | 1 | Strictura urethra ... | 1 | ... | ... | Ditto, 31 days. |
| | Internal division ... | 4 | Strictura urethra ... | 4 | ... | ... | Ditto, 46·25 days. |
| Removal of Calculus. | Lithotomy ... ... | 1 | Calculus vesica ... ... | 1 | ... | | *Vide* Case 9 in Detailed Account. |
| Plastic Operations. | To restore nose ... ... | 1 | Tertiary syphilis ... | ... | 1 | | Flaps taken from the cheek. |
| | To restore lips and nose | 1 | Suicidal gunshot wound | ... | 1 | | *Vide* Case 12 in Detailed Account. |
| On the Genital Organs. | Excision of testicle ... | 3 | Sarcocele (N. G.) ... | 1 | 2 | | *Vide* Case 10 in Detailed Account. |
| | Syme's operation for fungus ditto. | 2 | Sarcocele ,, ... ... | 2 | ... | ... | ..... |
| | Tapping and iodine injection. | 12 | Hydrocele ... ... | 9 | 3 | | One of these cases was tapped five times, and injected with iodine twice. |
| | Operation for varicocele. | 1 | Varicocele ... ... | 1 | ... | ... | ..... |
| | Circumcision ... ... | 1 | Phymosis ... ... | ... | 1 | ... | ..... |
| On the Anus. | Removal of Hæmorrhoids by ligature ... ... | 1 | Hæmorrhois ... ... | ... | 1 | | This case was 53 days in hospital after operation. |
| | Removal of Hæmorrhoids by Smith's clamp and cautery... ... ... | 7 | Hæmorrhois ... ... | 5 | 2 | | Average stay of these cases 22·51 days. |
| | Division of spinchter ... | 3 | Fistula in ano ... ... | 1 | 2 | ... | ..... |
| On the Eye. | Enucleation of eyeball... | 2 | Sympathetic ophthalmia Parrophthalmia ... ... | 2 | ... | | One of these cases followed penetration of the tunics by a piece of wood. and the other on an attempt to remove a hard cataract. |
| | Tenotomy of internal rectus ... ... ... | 2 | Strabismus convergens... | 1 | 1 | ... | ..... |
| | Extraction of lens ... | 1 | Cataract ... ... ... | 1 | ... | | Scoop operation the one performed. |
| | Removal of conjunctival tumor ... ... ... | 6 | Sequelæ of ophthalmia... | 4 | 2 | ... | ..... |
| | Iridectomy ... ... | 2 | Tumor ... ... ... | 2 | ... | ... | ..... |
| | Removal of conjuctional tumor. Removal of pterygium... | 1 | Ophthalmia ... ... | 1 | ... | | Both eyes operated on. |
| | Peritomy .. ... ... | 1 | Ophthalmia ... ... | ... | 1 | ... | ..... |
| Miscellaneous. | Puncture of bladder ... | 1 | Strictura urethra ... | .. | ... | 1 | *Vide* Case 8 in Detailed Account. |
| | Slittizg up sinuses ... | 2 | Chronic abscesses ... ... | 2 | ... | ... | ..... |
| | Removal of sequestra ... | 3 | Necrosis ... ... ... | ... | 3 | ... | ..... |
| | Tenotomy of biceps ... | 1 | Contractura ... ... | 1 | ... | ... | ..... |

ABSTRACTS.

*Case* 1.—*Amputation of the Thigh by Carden's method.*

Corporal R. G., 34th Regiment, age 36. The right knee-joint was injured by a fall; it inflamed and suppurated, and several openings formed, which would not close. His health, which had previously been very good, began to give way, and on his admission to the Royal Victoria Hospital amputation was deemed necessary. The flap sloughed, and two inches of the femur necrosed and required removal about two months after the amputation. Recovery was slow, but after five months he was discharged with a good useful stump. His family history was good, and he had never had syphilis.

*Case* 2.—*Amputation of Lower Third of Thigh by Spence's method.*

Private W. B., 16th Lancers, age 28. Had a severe attack of rheumatic fever in India, accompanied by erysipelas of the leg, formation of bed stores, and delirium. When admitted was in a very weak and hectic condition; the right tibia was extensively necrosed; the knee-joint was implicated, and, on dissection after removal, was found totally disorganized. When he had recovered his health somewhat by the help of good diet, &c., amputation was performed by Spence's modification of Teale's method. For ten days after the operation his pulse never sank below 100°, and his morning's temperature averaged 99°, the evening 100° Fahr. Great benefit was found from the use of chloride of zinc lotions. Recovery was not retarded by any untoward symptoms.

*Case* 3.—*Amputation through Lower Third of Femur.*

E. G., Army Hospital Corps, age 5, a tolerably healthy child, with no known predisposition to tubercular disease, fell on board ship over a chain, striking his left knee violently; great swelling and pain in the joint followed, and an abscess formed about, but apparently not connected with, the joint. About 4 months after this had healed, the joint commenced to swell gradually, and loose its shape without much pain or constitutional disturbance; a second abscess subsequently formed and burst in the same places as the first. On admission, on November 12th, the joint was found much enlarged, especially laterally and above the patella, and on the outside an opening existed, which discharged large quantities of matter, and through which a probe could be passed into the joint where bare bones is felt. Pain considerable, particularly at night, with frequent startings of the limb.

The disease being evidently too extensive to hope for anchylosis, and the age of the child precluding resection, amputation was performed just above the knee, according to Carden's method, with a long anterior flap, from which the patella was removed and a very short posterior one. Only one vessel required ligature. The stump was dressed with carbolic acid lotion, and the patient was well supported with port wine and Liebeg's extract of beef. The ligature came away on the 13th day after operation. He moved about on crutches on the 38th day, a little discharge still coming from a sinus at inner angle. No dead bone could be felt. He was discharged convalescent on the 79th day for change of air—a very little matter being still discharged.

*Case* 4.—*Amputation of Leg.*

Private W. B., 91st Regiment, aged 35. An abscess formed just above the right inner ankle in May 1866, and for two years continued to discharge thin unhealthy matter. There was no history to account for its formation. He was admitted on April 23. Extensive caries of the tibia was found, and on July 13 the limb was removed 4 inches below the tubercle of the tibia. He made an excellent recovery, leaving the hospital with a good useful stump 114 days after the operation.

*Case* 5.—*Amputation of the Foot* (*Parry's*).

Private R. G., 1st Battalion 11th Regiment, aged 45, sprained his right ankle-joint; this was followed by gelatinous degeneration of the joint and caries of the tarsal bones. The right foot was removed by Deputy Inspector-General Perry's modification of Syme's operation. Some reactionary hæmorrhage followed, but was easily arrested, and then the man made an excellent recovery, leaving the hospital in 146 days with a very good stump.

*Case* 6.—*Amputation of the Arm* (*Circular*).

Private P. F., 106th Regiment, age 26. Disease of right elbow, of syphilostrumous origin. Excision was commenced, but the humerus was found denuded of periosteum nearly up to the insertion of the deltoid, just below which the arm was removed by the circular method. The stump was dressed with carbolic acid and oil, and very little suppuration followed. The wound completely healed in about 30 days, and he left the hospital on the 58th day quite well.

*Case* 7.—*Amputation of Digits.*

In one of these cases the second and third fingers, with the heads of the metacarpal bones of right hand, were removed for an old gunshot injury. In another the second and third fingers of left hand were removed for necrosis resulting from wound of the palm by a piece of slate pencil. In another, the third finger of right hand was removed for great inconvenience resulting from anchylosis, the effects of onychia. In another, the last phalan of the right thumb was removed for onychia; and in the last, the fourth left metatarsal bone was dissected out for necrosis. The second one occurred to a schoolmaster, who was able to return to duty; the others were invalided.

*Case* 8.

Private A. S., 87th Regiment, age 31, suffered from symptoms of stricture, increasing in intensity for last year. Two very dense strictures existed, one 1½ inch from orifice, the other near bulb of urethra. Several attempts were made to pass a catheter and failed, but at last No. 1 was got in and secured, but so much irritation was caused that it had to be removed in three hours. The urine drawn off was very ammoniacal and mucus. By the help of fomentations, opiate enemata, &c. No. 2 was passed, but could not be retained. The bladder was next punctured per rectum, and above two pints of high coloured, turbid, ammoniacal urine drawn off. The urine extravasated into the perinæum and scrotum, and notwithstanding that free incisions were made to let it out, sloughing came on, and he gradually sank, and died six days after the operation. At the *post-mortem* the kidneys were found extensively diseased, being mere collections of abscesses, and signs of recent pneumonia were found in both lungs.

*Case* 9.—*Lithotomy* (*Lateral Operation*).

Private H. M., 83rd Regiment, age 20, suffered from symptoms of stone in the bladder for upwards of 12 years. Great irritability of bladder, frequent calls to, and pain after, micturition; ropy mucus, pus, and blood found in urine. Measurement of longest axis of stone given by lithotrite 1 inch. The lateral operation was performed, and a rough tubercular mulberry calculus, coated with fibrine, was extracted, corresponding with the measurement obtained by the lithotrite. Some troublesome venous hæmorrhage followed the operation. About a month elapsed before he passed urine per urethram, but he went to duty 272 days after the operation.

*Case* 10.—*Excision of the Testicles.*

Gunner J. F., Royal Artillery, age 31. Was invalided for chronic orchitis, (N.G.) caused by a fall against a gun-carriage, which injured the left testicle. It inflamed and suppurated, but did not become fungous, and ultimately

healed up. In the meantime the right became affected, suppurated, and became fungous, and caused so much irritation that it was removed in February. Towards the end of the year the left testis again inflamed, and at last was removed by Staff-Surgeon Ekin, M.B.

*Case* 11.—*Excision of Elbow.*

Private W. C., 84th Regiment, age 25. Injured his right elbow on March 27, 1868, by a fall while running. The nature of the accident was not made out at the time in his regimental hospital, and he was treated with fomentions, &c. On October 8th an attempt was made with pulleys to restore his arm to its proper shape, and failed. He was admitted in the Royal Victoria Hospital on November 14th, 232 days after receipt of injury; the radius and ulna were then found to be dislocated backwards and outwards. Fresh attempts at reduction were made without success, and on December 5, the joint was resected. Some secondary hæmorrhage followed the operation which was stopped finally by Richardson's styptic, colloid pressure with pads of lint steeped in tinct. ferri perchlor. and ice, &c., having failed. The wound was then dressed with carbolic acid lotion and oil, but a great deal of suppuration followed, with troublesome abscesses and sinuses about and between the bones. Two of these were opened. The discharge ceased about the 10th January. Passive motion was kept up. The wound did not heal completely until February 6th, and when discharged he had the full command over his joint motion in every direction, being nearly normal, and the muscular power nearly equal to that of the other arm.

*Case* 12.—*Plastic Operation to restore Lips and Nose.*

Gunner J. B., Royal Artillery, age 29. A man of good character, but drinking hard at times. Attempted to commit suicide while under influence of drink at St. George's, Bermuda, on August 26, by placing his carbine beneath his chin, and springing the trigger with his foot. The ball entered about an inch behind the symphysis menti and in the middle line, took a course almost directly upwards, and emerged by the root of the nose, producing a compound comminuted fracture of both superior maxillary bones and of the nasal bones, wounding the tip of the tongue, and doing much injury to the soft parts about.

He was admitted into the Royal Victoria Hospital on February 29th, 1868, in the following condition:—The cicatrix of entry is visible beneath the jaw, most of the body of the lower jaw and the lower incisor teeth have been shot away; all the upper teeth, with the exception of one right upper molar, are gone; the nasal bones are gone, a large deep quadrangular cavity marking the site of the nose; the upper lip is split, like a single hare lip; the lower is split in two places; the tip of the tongue is lost, and the body of it is tightly bound down by cicatricial bands. There is dribbling of saliva from the injury done to the lips, and stillicidium lachrymarum from obliteration of nasal duct. After his general health had been improved by diet regimen, &c., he was operated on May 5th, 1868; the upper lip was partially separated from the jaw, and the edges of the fissure pared and brought together by two hare-lip pins. The cut edges united firmly by adhesion, and on May the 9th the pins were removed, leaving the lip quite firm. On May the 11th the whole lip was completely healed. On May 14th the lower lip was operated on, the adhesions separated, the edges pared, and the raw surfaces brought together with hare-lip pins. This united also by primary adhesion, and on May 18th the pins were removed; May 29th, lip quite healed. June 23rd, the tissue was separated round the nasal cavity, the edges pared, an obcordate flap brought down from the forehead, and secured by silk sutures in its new situation, the wound left in the forehead being brought together by pins and twisted sutures. The flap united very well in all parts save a small place at the left angle, which suppurated and required refreshing on July 3rd; with this small exception, the whole went on very well indeed. The wound on the forehead did not heal completely until August 1st, and on August 3rd he was invalided, his lips being almost natural, and the nose immensely improved.

*Case* 13.—*Excision of the Wrist* (*Lister's*).

Private P. M'N., 2nd Battalon 5th Regiment, age 25. Was admitted into the Royal Victoria Hospital on April 11th, 1868. Previous to his enlistment in July 1860, he was a labourer; always enjoyed good health; never had syphilis; had never been in hospital save for his present disease; parents healthy.

In May 1866, while at the Cape, he tripped and fell with his whole weight upon his right hand and wrist. He believes that "the bones of the fore-"arm rested upon the back of the hand"; at all events, the wrist became greatly swollen and very painful, and all power of motion was lost. He was at once admitted into hospital, but was sent back to duty again in nine days' time free from pain, but with some swelling still about the joint. The joint continued stiff and more or less swollen until June 1867. While on the voyage home a small abscess formed and opened on the radial side of the wrist, leaving a sinus still unhealed. Two months later the forearm became acutely inflamed; an incision was made on the ulnar side of the wrist, and a large quantity of matter evacuated. Fresh abscesses formed at intervals on the anterior aspect of the joint, leaving sinuses behind them.

On admission into the Royal Victoria Hospital there was seen to be great enlargement of the right wrist, and considerable thickening and condensation of the adjacent textures for 2 or 3 inches both above and below the joints, the swelling being almost confined to the back. There is a sinus over the styloid process of the radius, another on the ulnar side, and six on the palmar surface; dead bone can be distinctly felt on the ulnar side, and the probe passes into the wrist among the carpal bones. He has considerable power over the fingers, flexion and extension of which is not much interfered with. The following were the measurements of the respective joints:—

| | Across the Knuckles. | 1-inch above Knuckles. | At Wrist. | 1-inch above Wrist. |
|---|---|---|---|---|
| *Left Side* .. .. .. .. | 8 | 8 | $6\frac{3}{4}$ | 6 |
| *Right Side* .. .. .. .. | 8 | $8\frac{1}{4}$ | 9 | 7 |

He was ordered good diet, tonics, and to keep the arm in a sling, and to use water dressing and arm baths, and later poultices, and opiates at night occasionally.

The patient was carefully examined, and all agreed that there was no hope of improvement without operative interference, and the opinion was entertained that the hand might be saved by re-secting the wrist-joint, as the flexor tendons and their sheaths were evidently free from the disease, as shown by the mobility of the fingers.

The wrist-joint was accordingly excised by Professor Lister's method on June 3, 1868. The whole carpus, except the pisiform bone, was removed, with the ends of all the metacarpal bones and about 1 inch of the lower ends of the radius and ulna. The cut end of the radius was found diseased, so half an inch more was taken away, a space of 3 inches being thus left between the radius and the metacarpus. No vessel was ligatured. The incisions were mopped out with carbolic acid and linseed oil, 1 to 10, and lint soaked in the same solution was introdueed into the wound to support the tendons. Sutures were applied along the radial incision, and one at either end of the ulnar, and the limb then put on a Lister's splint. The several joints of the fingers *were freely manipulated* before his removal from the table.

Three hours after the operation there was considerable oozing of blood from the cut ends of the radius and ulna; pressure, cold, and styptics having failed to arrest it, the actual cautery was applied to the ends of both bones, and one small vessel was ligatured; the wound was then stuffed with dry lint. There was no recurrence of the hæmorrhage. This plug was removed on the second day; the wound looked healthy, suppuration slight; syringed

out with a weakly solution of carbolic acid, and a pad of lint soaked in carbolic acid and oil again applied to support the tendons. The fingers were freely manipulated as before. This continued for a week, when it was no longer considered necessary to insert the pad of lint; the same dressings were used, and the fingers well exercised daily; the patient could himself move them, especially the thumb and little finger. Scarcely a drop of pus could be seen.

During the third week pronation and supination were practised, and the patient became able to raise his hand from the splint without assistance.

During the fourth week the wounds were occasionally dressed with chloride of zinc lotion to repress some granulations which had become too luxuriant, and the radial incision was strapped with isinglass plaister.

During the fifth week flexion and extension of the wrist was used daily, in addition to the other movements; the ulcers on the front of the wrist filled up, and the patient's general health was much improved.

By the end of the sixth week he could hold a pen or pick up a walking-stick, and partly pronate and supinate the hand. In a few more days the radial incision closed and the ulnar alone remained as a small linear ulcer.

By the end of the eighth week he could use his fingers almost perfectly, and the wrist felt firm on pressure; but on leaving off the splint altogether a slight attack of inflammation followed, which, however, subsided in two or three days. He gradually and steadily improved until the date of his discharge, when all the motions of the joint were perfect, and he was able to raise a weight of 70 lbs. with the affected arm.

The wrist was round and symmetrical, but the hand was drawn a little to the ulnar side of the forearm (there is always a tendency to this), but the space between the tendons is well filled up, and feels solid. The shortening was much less than could have been expected, being about 1½ inches, as the following measurements show:—

| | Right. | Left. |
|---|---|---|
| From the tip of olecranon to tip of little finger | 14⅝ | 16¼ |
| " " " middle " | 16¼ | 17⅝ |
| " " " thumb | 14⅞ | 16 |

These results also show the shortening to have been greater on the ulnar than on the radial side on account of the obliquity of the wrist. The patient was discharged from hospital on the 20th of April, 1869, with a very useful and symmetrical hand, which retained the power of flexion and extension, eversion and inversion, pronation and supination, and its strength so restored that he could raise, with fairly outstretched hand, a barrack scuttle full of coals weighing nearly 77 lbs.

The new wrist was quite strong and firm, and almost in all respects equal to the other.

I had instruments made for the operation after sketches kindly furnished to me by Professor Lister, and in performing the same I followed his directions in every particular. (*See* "Lancet," vol. 1, 1865, page 335). In the subsequent treatment of the case I had the advantage of the assistance of two of Mr. Lister's former pupils, Doctors A. Cameron and J. C. G. Carmichael, who had opportunities of witnessing the results of similar cases under his care in the Glasgow Royal Infirmary.

I have endeavoured to trace the patient to his home in Ireland, and I am informed he has emigrated to America as a settler, a proof I think that he has retained a strong and useful wrist joint.

YEAR 1869.

| Operations. | | Number of Cases. | Disease | Result. Duty. | Invalided. | Died. | Remarks. |
|---|---|---|---|---|---|---|---|
| Amputations | Leg ... ... ... | 3 | For ulceration and disease of bone ... ... ... | | 3 | ... | One of these was the case of a boy, a soldier's child, and did well. |
| | | | Disease of ankle ... ... | | | | |
| | | | For necrosis ... ... | | | | |
| | Foot (Parry's modification of Syme's amputation) ... ... | 1 | Caries of tarsal bones ... | ... | 1 | ... | ..... |
| | Arm ... ... ... | 1 | Un-united fracture of forearm ... ... ... | | 1 | ... | ..... |
| | Fingers ... ... | 1 | Caries of metacarpal bones ... ... ... | | 1 | ... | ..... |
| Excision of Joints | Elbow ... ... ... | 3 | For arthritis ... ... | | 2 | 1 | *Vide* Case 4 in Detailed Account. |
| | | | For dislocation of elbow and fracture of humerus ... ... ... | | | | *Vide* Case 5 in Detailed Account. |
| | | | For caries of elbow ... | | | | |
| Radical Cure of Stricture | Holt's method ... ... | 1 | Urinary fistula ... ... | 1 | ... | ... | ..... |
| | Thompson's method ... | 2 | Both organic stricture ... | 2 | ... | ... | ..... |
| | Internal division ... | 1 | Stricture ... ... ... | 1 | ... | ... | ..... |
| Removal of Calculus | Lithotomy ... ... | 2 | Calculus vesicæ ... ... | 2 | ... | ... | *Vide* Case 6 in Detailed Account. |
| On the Genital Organs. | Excision of testicle ... | 2 | Both cases for scrofulous disease ... ... ... | | 2 | ... | ..... |
| | Tapping and iodine injection ... ... | 6 | For hydrocele ... ... | 3 | 3 | ... | ..... |
| | Operation for varicocele | 1 | For varicocele ... ... | 1 | ... | ... | ..... |
| | Circumcision ... ... | 1 | Primary syphilis ... ... | 1 | ... | ... | ..... |
| On the Anus | Removal of hæmorrhoids by ligature ... | 1 | Internal ... ... ... | 1 | ... | ... | ..... |
| | Removal of hæmorrhoids by Smith's clamp and cautery ... | 2 | For external hæmorrhoids | 1 | 1 | ... | ..... |
| | Division of sphincter ... | 1 | For fistula in ano ... | 1 | ... | ... | ..... |
| | Removal of tumour of rectum ... ... | 1 | ..... | ... | 1 | ... | Case of cancer in a man of a Militia regiment; patient left the hospital, and died ultimately. |
| On the Eye | Iridectomy ... ... | 8 | Two for iritis and closed pupil after syphilis ... | 3 | 5 | ... | ..... |
| | | | For staphyloma of cornea and irido-choroiditis ... | | | | |
| | | | For opacity of cornea and dislocation of left pupil | | | | |
| | | | For opacity of cornea ... | | | | |
| | | | Blindness and sequela of syphilitic iritis ... ... | | | | |
| | | | For chronic ophthalmia... | | | | |
| | Operation for ptosis ... | 1 | Ptosis of eyelid ... ... | 1 | ... | ... | ..... |
| | Græfe's operation ... | 1 | Cataract ... ... ... | ... | 1 | ... | ..... |
| Miscellaneous | Slitting-up of sinuses ... | 2 | For scrofula and abscess... | ... | 2 | ... | ..... |
| | Removal of sequestra... | 4 | Three for necrosis of tibia, one for that of sternum | | 4 | ... | ..... |
| | Tenotomy of biceps ... | 1 | Contracted after secondary syphilis ... ... | | 1 | ... | ..... |
| | Removal of fatty tumour ... ... ... | 1 | Fatty tumour of trapezius | 1 | ... | ... | ..... |

ABSTRACTS.

*Case* 1.—*Amputation of Leg.*

Private W. B., Coldstream Guards, age 22. Patient enlisted into the Coldstream Guards in May 1866, and was stationed in London until March 1867; he was ordered to Dublin, where he remained for twelve months; at the expiration of this time he returned to London, but in four weeks after he arrived he was admitted into the Guards' Hospital, suffering from ulceration of the cervical glands, and placed under the care of Mr. Wyatt. This proved rebellious to treatment, and did not improve under good diet and tonic medicines. After he had been a patient in the Guards' Hospital for three months the left ankle-joint became inflamed (no history of sprain, blow, or other injury). For this he was treated with blisters, splints, and starched bandages, The joint became worse, abscesses formed around it, and for two months there was profuse suppuration, with great constitutional disturbance; at one time as many as nine open sores. Efforts were made to save the joint, but failed; and as his health was giving way it was deemed advisable to operate, Perigoff's operation being performed by Mr. Wyatt on November 30, 1868. Secondary hæmorrhage to a considerable extent occurred after the operation, and for four hours ice and pressure failed to arrest it. The incisions healed very satisfactorily in less than a month; up to this time the wounds had perfectly healed, but now ulceration of the edges took place, and there were three or four separate patches of ulceration on the stump. Under these circumstances he was transferred to the Royal Victoria Hospital, Netley, for change of air, on February 2, 1869.

Some time after admission it was found that the stump left after Perigoff's operation was extensively diseased. It was evident that union of the sawn parts of the tibia and fibula with the os calcis had not taken place; there were several sinuses discharging pus very freely; bare and roughened bone could be felt in two or three places on introducing a probe. Ulceration of the edges of the incision had occurred in three or four distinct places.

After the acute mischief had subsided it was deemed advisable to operate, and on the 24th April the leg was amputated at the junction of the upper with the middle thirds by the flap operation. The tibia having been sawn across the sharp angle on its anterior aspect, was sawn off in a slanting direction from above, downwards and backwards. After the operation the patient progressed favourably, so that by the 11th October there was a firm pad of soft parts over the bones, and considerable pressure caused no pain whatever. On the 26th October, 1869, his health being so far restored, he was discharged from the Royal Victoria Hospital home to his friends.

The remaining portion of the os calcis, and the ends of the tibia and fibula, were examined after the removal of the limb, and they were found extensively diseased.

*Case* 2.—*Amputation below the Knee.*

Private W. H., 2nd Battalion 11th Regiment, age 31. In the month of June 1867 this man received a blow from a cricket ball on the inner aspect of right leg, about the junction of the upper and middle thirds. About a week afterwards it began to swell, and continued to enlarge until it had reached the size of a closed fist; it was of a dark purple colour, and intensely hot and throbbing. At first he went to duty, but was compelled to go into hospital at Graham's Town, where he remained until he was invalided to the Royal Victoria Hospital, Netley, on the 24th May, 1868. When the tumour was first incised a large quantity of dark clotted blood came away. Such incisions had to be repeated to set free pent-up matter; these incisions always speedily healed up, but deep-seated shooting pains remained in the seat of injury. It was evident that the periosteum and subjacent bone had been injured. Open and extensive ulceration threatened about two months after these repeated evacuations, so that when he came into hospital here the leg presented one large ulcerated surface extending over nearly one fourth of the middle part of the leg. Portions of this healed up entirely, but only to be followed by patches of ulceration in apparently healthy tissue. In December 1868 (after admission

to Netley) three open ulcers in the length of the limb were joined by deep and free incisions, and a portion of diseased bone gouged away; but no large pieces of bone were removed at that time, although previous to this, on several occasions, small irregular splinters had been removed. The patient did not improve the long time he was under treatment, notwithstanding frequent removal of pieces of bone; and the carious and necrosed condition of tibia and fibula extending, it was decided on November 26, 1869, to amputate the limb. The operation performed was the following:—Two equal semi-lunar flaps of skin were cut (from the outside, not by transfixion), one anterior and internal, the other posterior and external, so that their extremities met at points about two inches below the tuberosity of the tibia on either side. These were reflected up, and with them a further extent of skin, embracing the whole circumference of the limb, was dissected up, and the bones exposed one inch below the tuberosity. The anterior muscles being close to their origin, and consequently being able to retract very slightly, were cut as high as exposed; the posterior ones about the middle of their exposed surfaces. In sawing through the bones, in order to prevent splintering of the fibula, it was sawn along with the tibia, so as to finish it first. An acupressure needle was used to control hæmorrhage from an artery in the interosseous space; it was removed the next day. After the operation, patient made a good and rapid recovery, and was discharged home on March 8, 1870.

*Case* 3.—*Amputation of Right Forearm.*

Gunner D. P., Royal Artillery, aged 26, two years and two months' service. At Rangoon, on the 20th February, 1869, this man had just rammed a cartridge, when the gun, which had been insufficiently sponged, went off, carrying away the right forefinger, laying open the palm of the hand, and producing a compound fracture of both bones of the right forearm about three inches above the wrist, the end of the radius protruding through the wound. After consultation it was determined to attempt to save the limb, and conservative treatment was adopted. The wound of the hand healed with much sloughing of the tendons and the loss of two fingers; and in two months provisional callus had been formed round the bones at the seat of fracture, and the wound of the forearm had nearly healed. On the 17th May two inches of bone came away and some weeks later the callus became absorbed, leaving the fractured extremities ununited.

He arrived at the Royal Victoria Hospital, Netley, on the 4th November, 1869, with the symptoms of ununited fracture of the radius and ulna of the right arm. The middle and fore finger were lost; the ring and little finger were contracted, and without motion or sensation; the thumb stiff, and with little or no feeling. At 11 A.M. on the 22nd amputation was performed two inches below the elbow-joint by flaps. Shortly after being placed in bed considerable hæmorrhage came on, but was checked by the application of cold water. At 12·30 it recurred, when, on the ligatures being undone and the wound freely exposed, it was found to proceed from the anterior interosseous artery. Acupressure was applied to this vessel, and the bleeding ceased.

The wound was left open, and at 5·30 there being slight oozing from the surface of the stump, the "styptic colloid" was used, and there was no return of hæmorrhage till 7 P.M., when another small artery began to bleed. This was stopped by torsion. A drachm of the solution of morphia was given, and was repeated in six hours, and he was put upon good diet and wine.

*November* 23.—No hæmorrhage; pulse full, 88; appetite good; considerable thirst; surfaces of the wound well glazed over. At 10 A.M. the acupressure needle was withdrawn, the flaps re-adjusted, and wet lint and a bandage applied.

*Evening.*—Pulse 110; feverish and restless. The morphia was repeated.

*November* 24.—Had a good night. Pulse 95; fever much abated.

*Evening.*—Pulse 90; less feverish.

*November* 25.—Stump was dressed with carbolic acid lotion (1 in 80); it was looking well.

*November* 26.—Had a good night; pulse 80; temperature 99°.

*Evening.*—A little feverish; pulse 95; temperature 100°.

*November* 27.—Was rather restless during the night, and there was a good deal of suppuration. Carbolic acid lotion continued; bowels acted.

After this the case went on favourably, and the stump healed by granulation.

*Case* 4.—*Excision of Elbow-Joint* (*Right Side*).

Private D. H., 5th Lancers, aged 37. On May 29, 1868, he was admitted into hospital at Lucknow with a comminuted fracture of the lower end of the right humerus, involving the elbow-joint of the same side. The swelling was very great, and it was nearly a month before it was reduced sufficiently to allow splints to be applied.

The pain was very great on bending the elbow, and it was therefore put on a straight splint, as he could not bear the pain in a bent position. In about three weeks passive motion was attempted, and the joint was found to be very stiff, and resisted any attempt to bend it. When he left India the joint admitted of flexion to a very slight extent. Pronation and supination perfect.

On admission here there was found to be dislocation of right radius and ulna at elbow; the luxation not reduced. On examination the joint is completely stiff, the place occupied normally by the head of the radius is vacant, and the head itself is to be felt backwards. Forcible extension was tried under the influence of chloroform, but was unsuccessful. It was decided to excise the joint; the operation was performed on 24th February, 1869, by Staff-Surgeon Ekin, by one longitudinal incision.

He bore the chloroform well; there was slight venous oozing, but no arteries divided; he suffered for a short time from some pain, but he gradually and daily improved, and on May 1st his appearance is good. His arm is strong, and the wound in the elbow nearly healed. On the inner side of the joint there is a good deal of redness and swelling, and from this he suffers pain still; the swelling is hard, and appears connected with the bone. He can flex the forearm, and can also supinate and pronate, but all the motions are performed to a limited degree, but suffers no pain from its being moved.

*May* 6.—The inner side of the joint is red and swollen, and he complains of great pain in the part, especially at night; and when he moves the arm the tendons appear to him to be contracted and stiff.

*May* 10.—An angular splint was applied to the arm.

*May* 18.—The wound has ceased to discharge, and all dressing to be left off; he can use the arm slightly, but, as he states himself, it seems to lock on flexion being practised.

*May* 20.—This morning he thinks the arm much improved, but there is very little change in it from last note.

The induration is fast diminishing under the use of the iodide of potassium ointment; his general health continues good.

*May* 23.—There is no decided change in the condition of the elbow, to an examiner of the limb, as the bones seem to lock as firmly as ever; the patient appears to think that he is getting the use of it.

*May* 25.—As the patient is going out shortly, it has been proposed to him to operate again for the removal of more bone. He firmly refuses, and goes out with but limited motion of the arm, for on flexing the arm the bones of the forearm are obstructed in their movement by locking against the condyles of the humerus, which have not been removed. The wound in the elbow is healed, but the cicatrix is not very firm, and if the arm is much used it swells considerably. He can practice pronation and supination with it very well, but the flexion is limited for the above reason.

*May* 26.—Discharged the service as unfit for military duty.

This case is an example of one which turned out a partial success only: I believe from insufficient removal of bone. In resection of the elbow-joint it is particularly necessary to take away bone unsparingly.

*Case* 5.—*Resection of Left Elbow-Joint.*

Private G. A., Military Train, aged 24, a healthy looking soldier of temperate habits, but had suffered from syphilis, was admitted into hospital at Aldershot in June 1868, suffering from caries of left elbow-joint. About a

week afterwards an abscess began to form in the region of the joint, the swelling extending both above and below the elbow. The formation of matter was accompanied by intense pain of a deep-seated nature, causing nocturnal sweatings, restless nights, and other hectic symptoms; and when the abscess was eventually opened a quantity of gritty and offensive matter was discharged. In the course of time the tissues surrounding the affected part became thickened, the skin of a glazed and dusky colour, whilst another abscess, running along the course of the triceps muscle, and pointing about its upper third, was opened with great relief to patient. Through the incision over the elbow-joint a probe could be introduced and passed down to what appeared to be a portion of the radius; this seemed rough, and devoid of periosteum. The patient passed sometimes a fortnight or three weeks without pain in the joint, but at irregular and uncertain periods it would return with intense severity, and giving rise to symptoms of hectic fever. He was admitted into the Royal Victoria Hospital, Netley, on April 1, 1869. Previous to admission he had been in hospital for ten months, so that at this date the elbow-joint was much enlarged, and several fistulous openings were formed, communicating with the joint. On 15th April, 1869, resection of the left elbow-joint was performed. About one inch of the humerus, and the extremities of the radius and ulna, were removed, being in a carious condition. The wound was plugged with lint, and a bandage applied loosely over the joint. The wounds continued slowly to improve until the 14th May, when patient began to complain of severe pain over the head of left femur, and radiating down the course of the obdurator nerve. The pain was increased by pressure, and over the head of the bone there was marked swelling. By the 31st May the pain over the left femur had entirely gone. For the next few months his general health had improved, and on the 1st November the operation wound was almost entirely healed, except at one small point. A short time previous to this last-named date he again began to suffer from swelling over the left hip-joint, which gradually increased in size, so that an opening was made into it, and a large quantity of pus escaped. Pus continued to discharge from the abscess, and on the 20th November a counter-opening was made a little below the great trochanter; but patient gradually became weaker, and died on the 11th January, 1870.

*Case* 6.—*Lithotomy.*

M. N., a soldier's child, aged 4 years, was admitted into the Royal Victoria Hospital, Netley, on the 15th April, 1869, suffering from a calculus of the bladder. On the 16th of the same month the lateral operation of lithotomy was performed. After the operation the boy progressed well, and was discharged from hospital on the 21st May, 1869, quite recovered.

*Case* 7.—*Amputation of Right Ankle-Joint.*

Private O. M., Army Hospital Corps, aged 37. He suffered from primary syphilis about twenty years ago, but was not apparently affected by secondary symptoms. He has had several severe attacks of rheumatism implicating the head, shoulders, and knee-joints, but never affecting the ankles.

Two years ago, without injury or other apparent cause, the right ankle-joint became painful, tender, and swollen. Rest and fomentations subdued these symptoms in about a week, and he returned to duty. Recovery, however, was only transient; swelling recurred again and again, each time in a more aggravated form than before. Five months ago suppuration occurred, and an opening was made to evacuate the pus. Shortly afterwards dead bone was detected.

On the 18th January, 1869, Parry's modification of Syme's amputation at the ankle-joint was performed. In the parts removed the os calcis and cuboid bone were carious, and the joint between them diseased. The cartilage on the under surface of the astragalus was ulcerated. The internal mulleolus was also diseased. The soft parts were very vascular, and in parts were infiltrated with pus. Owing to the vascularity of the stump four ligatures were required, and the wound was irrigated after the operation with iced water.

Hæmorrhage, however, proved troublesome, and was only arrested by elevation and the use of perchloride of iron. Till the 25th January the wound was dressed from the bottom with carbolic acid and oil (1 to 20). After this date the edges were approximated with adhesive strapping. On the 26th all the ligatures came away.

Recovery after this date was uninterrupted, and patient was discharged to go home on 24th May, 1869, with a good stump, having a firm, strong, and broad base of support.

The case illustrated well the advantages claimed for Parry's operation.

*Case* 8.—*Prostatic Abscess with Pyæmia.*

Corporal W. A., 97th Regiment, aged 25 years, service 3 years and 2 months On the 31st December, 1868, while on furlough at Southampton, this patient got wet, and sat for some time in his wet clothes. On the 2nd January he began to experience difficulty in micturition, and had a rigor followed by perspiration. On the morning of the 3rd he could only be relieved by a catheter, which however passed without difficulty, and on the evening of the same day tumefaction of the scrotum and perinæum was observed. The dysuria continued till the 6th, but the use of the catheter was not required.

He was sent to the Royal Victoria Hospital by the Staff Officer of Pensioners at Southampton, on the 8th January, 1869, when he presented the following symptoms:—Considerable pain and difficulty of micturition, enlargement and tenderness of the prostrate gland, on examination in the perinæum and *per rectum*, with œdema of the scrotum and pubis, but not of the penis. The pulse was full and hard, but not rapid; the face flushed; the eyes suffused; the tongue foul, streaked with brown down the centre.

The skin was acting freely, the bowels constipated, and he complained of sleeplessness and much thirst.

Next morning a full-sized catheter was passed, and drew off about half a drachm of purulent fluid, and the urine afterwards evacuated was loaded with pus.

On the 10th he had severe rigors, followed by profuse perspiration and great prostration; and an incision was made into the prostrate gland through the perinæum, the forefinger being introduced into the rectum to steady the gland and force it forwards into the perinæum. This gave exit to a large quantity of very fœtid pus, with relief to the pain and difficult micturition. During the next three days the patient complained of great weakness, and was covered with profuse perspiration.

The pulse rose from 102 to 114, the discharge from the wound made in the perinæum ceased, and the pain and distension of the scrotum became so great that incisions were at different times made into it for the escape of serum. The penis also became œdematous.

On the 13th he had another severe rigor, and the characteristic symptoms of pyæmia began to develope themselves, the anxious pinched features and the heavy sweet odour of hay being well marked. The urine was scanty and high-coloured, and partially escaped by the perinæum.

After this pus began to flow from all the incisions, with diminution of the swelling; and on the 16th sloughs of the cellular tissue came away from those in the scrotum, showing that the tumefaction had been due to a phlegmonoid erysipelas.

On the 17th he complained of great pain in the right hip-joint and os calcis; and in twenty-four hours a general swelling of the whole limb, resembling phlegmasia dolens, had come on, and the superficial veins of the leg became distended.

The pain in the hip-joint increased in intensity, so that he could not bear to be moved, and he had another severe rigor. It was tender on pressure, but there was no redness of the surface.

These symptoms of metastatic abscess in the hip-joint, and thrombosis in the femoral veins, continued, with little abatement of severity, till the end of the month, with a pulse varying in rapidity from 90 to 108, and a temperature of about 101°. At the same time the expression lost its anxiety, the strength and appetite improved, the wound in the perinæum closed, the scrotal sloughs

separated, and the incisions healed by granulations. The symptoms referable to a purulent effusion into the hip-joint continued for many weeks, during which the patient made a slow recovery, and was ultimately discharged from the service on the 27th July, with stiffness and partial anchylosis of the articulation.

The treatment consisted, at first, of warm baths and popppy-head fomentations; quinia and the mineral acids when pyæmia became well marked, and a mild, nutritious, non-stimulating diet. Afterwards he was given support of every kind. Subcutaneous injections of morphia were necessary to relieve the pain in the hip, and carbolic acid and charcoal poultices were applied to the perinæum and scrotum during the separation of the sloughs.

*Case* 9.—*Fatty Tumour.*

Private M. W., 109th Regiment, aged 39. This man was admitted into the Royal Victoria Hospital, Netley, on the 25th March, 1869, suffering from a fatty tumour, about the size of a large kidney potato, over region of right trapezius muscle.

On the 6th of April, 1869, the tumour was removed by making an incision about four inches in length along the supra-spinous fossa, and cleanly dissecting it off the upper border of the trapezius muscle.

The patient made a good recovery, and was discharged on 12th June, 1869.

YEAR 1870.

| Operations. | Number of Cases. | Disease. | Result. Duty. | Invalided. | Died. | Remarks. |
|---|---|---|---|---|---|---|
| Amputations — Thigh. Amputation of lower third | 1 | Disease of knee-joint | ... | 1 | ... | *Vide* Case 1 in Detailed Account. |
| Amputations — Through knee-joint | 1 | Ulceration of the Leg, with extensive disease of the bones | ... | ... | ... | Case of a soldier's wife. |
| Amputations — Fingers | 1 | Necrosis of Ring Finger (syphilitic) | ... | 1 | ... | ..... |
| Excision of Joints — Elbow | 1 | Anchylosis of right elbow-joint | ... | 1 | ... | *Vide* Case 3 in Detailed Account. |
| Radical Cure of Stricture — Holt's Method | 2 | Stricture of Urethra (both) | 1 | 1 | ... | ..... |
| Radical Cure of Stricture — Internal Division | ... | Stricture of Urethra | ... | 1 | ... | ..... |
| Radical Cure of Stricture — Operation for Urethral Fissure | 4 | Hypospadic Fissure of the Urethra | 3 | 1 | ... | ..... |
| Removal of Calculus — Lithotomy | 2 | Calculus Vesicæ. In one of these Lithotomy was performed a second time on the same patient eight months after the first operation | 2 | ... | ... | *Vide* Case 4 in Detailed Account. *Vide* Case 5 in Detailed Account. |
| On the Genital Organs — Tapping and Iodine Injection | 2 | Hydrocele | 1 | 1 | ... | ..... |
| On the Genital Organs — Operations for Varicocele | 2 | Varicocele. Both operations on one man, the first in February, the second in April | 1 | ... | ... | ..... |
| On the Genital Organs — Circumcision | 1 | Abnormal long prepuce | ... | 1 | ... | ..... |
| On the Anus — Removal of Hæmorrhoids by ligature | 1 | Hæmorrhoids | ... | 1 | ... | ..... |
| On the Anus — Removal of Hæmorrhoids by Smith's clamp and cautery | 2 | Hæmorrhoids | ... | 2 | ... | ..... |
| On the Anus — Division of Sphincter | 3 | For Fistula in Ano | 3 | ... | ... | ..... |
| On the Eye — Iridectomy | 2 | Leucoma of both eyes. Wound of Cornea | 1 | 1 | ... | ..... |
| On the Eye — Entropium | 1 | Sequela of Chronic Ophthalmia. Cantho-plastic | ... | 1 | ... | ..... |
| On the Eye — Schuft's Operation | 1 | Cataract of left Eye | ... | 1 | ... | ..... |
| Miscellaneous — Slitting-up Sinuses | 2 | Abscess of Anus. Suppurating bubo | 1 | 1 | ... | ..... |
| Miscellaneous — Removal of Sequestra | 3 | For Necrosis of Tibia. For Necrosis of lower Jaw. For Caries of the Os Calcis | ... | 3 | ... | ..... |
| Miscellaneous — Opening of Abscess and Iodine Injection | 1 | Chronic Arthritis of the Hip-joint | .. | 1 | ... | ..... |

ABSTRACTS.

*Case* 1.—*Amputation of Lower Third of Left Thigh.*

Private J. M., of 108th Regiment, age 28. Patient was invalided from Belgaum to Netley at the end of the year 1868 for scrofula. From that date up to June 1870, he has suffered very much from abscesses of the left thigh, which have pointed in several places from the trochanters down to the knee. There has also been synovitis of the same knee-joint.

At present, June 1870, he is very much reduced and emaciated. There are still ulcers and small sinuses over the trochanters and behind the knee, but his spirits and appetite are tolerably good.

The treatment has been tonics, good nourishment and local applications. From the above, dated June 1870, patient became very much reduced in strength. The limb also became contracted, and on the morning of the 24th October, severe arterial hæmorrhage took place from one of the lower sinuses. It was controlled by the tourniquet and enlargement of the sinus, plugging the opening by means of lint soaked in perchloride of iron. On the 30th and 31st October, severe arterial hæmorrhage again took place, which was controlled in the same manner as before.

On the 31st October, amputation was performed at the junction of middle and lower third of left thigh, by the flap operation; scarcely any blood was lost, and the patient bore the operation exceedingly well. On opening the joint, and dissecting the neighbouring soft parts, the coats of the popliteal artery were found much thickened, so much so that the artery was almost closed. The head of the tibia and fibula, with the condyles of the former, were denuded of their covering and very soft, with fringes of fibrine thrown out.

On examining the limb after operation, the sinuses were all found to tend to the lower part of the popliteal space. The seat of an irregular cavity filled by firm fibrinous masses intimately adherent to the posterior ligament of joint, and a quantity of ordinary blood coagulum.

The point of hæmorrhage was found to be not from the main artery, but from one of its inferior and inner branches, probably the inferior internal articular. The popliteal passes through the space its coats (especially externally), much thickened and lined internally by a fibrinous stratum, which passed for some distance both above and below, and reduced the calibre of the vessel, for the passage of blood to a very small degree, producing, together with the general thickening of tissues around the joint anteriorly, a complete obstacle for the establishment of the collateral circulation, had ligature of the femoral artery been decided upon.

On opening the joint the cartilage and synovial membrane were found to be in the early stage of the so-called "pulpy degeneration." The cartilage at the centre of each tuberosity of tibia, corresponding parts of condyles, and also patella, being granular on surface, eroded, vascular, soft, and easily separating from subjacent bone—the synovial membrane especially over the posterior ligament highly vascular, swollen, and fringed. The bone on section extremely soft and friable, yellowish, laden with fat in the cancelli, and where corresponding to cartilage as before-mentioned much increased in vascularity. Specific gravity of bone much diminished.

Microscopic examination demonstrated the synovial membrane to be infiltrated with fat globules, the cells of cartilage atrophied with intercellular substance, granular, and studded with fat, the lime partaking of the same character.

After the operation, the patient recovered well, and on the 13th December 1870, he was discharged the service as unfit for military duty.

*Case* 2.—*Amputation through left Knee-joint* (*disarticulation*).

Mrs. E. S. (1st Royals), age 28. A delicate looking woman, invalided from Madras, states that she was born at Birr, in Ireland, and that she was quite healthy up to three years ago.

Was married in 1861, and proceeded with her husband to India in 1863. She had excellent health from the date of her arrival in that country in January 1864, until May 1867. About this time, while proceeding by rail from Bangalore to Beypore, she fell from a railway carriage and sprained her left ankle. The foot and leg were swollen for some time after the receipt of the injury, and in August of that year she first noticed a sore beneath the external malleolus. The sore remained open for about three months, and when it healed other sores broke out on the instep, which are still discharging.

In December 1867, while on the march from Cannanore to Maliporam, she became much worse, and two other sores formed, one over the metatarsal bones, the other at the roots of second and third toes. From Maliporam she was sent to the Neilgherries in June 1868, and while there the sores nearly healed. From the last-named station she was sent to Poonamallee, in August 1869, and on that march the original sores broke out, and

another large one formed on the anterior aspect of leg, midway between the knee and ankle.

She was then sent to Madras, where she embarked for England on the 2nd March, 1870.

While on board ship numerous ulcers broke out on the external and posterior surface of the leg.

On admission to the Royal Victoria Hospital, Netley, her general health was very indifferent. There are many puckered cicatrices about left ankle-joint, and a contracted condition of the latter, which gives the foot the appearance of congenital talipes equinus. On the dorsal aspect of the foot are three deep-seated ulcers, with very irregular edges. On the anterior aspect of the leg, about midway between the knee and ankle-joints, there is a large ulcer about 3 inches in length and 2 inches in breadth, having its long diameter parallel to the anxis of the limb. The posterior aspect of the limb, from the tendo-achilles to the popliteal space, is riddled with ulcers of various sizes, and similar in appearance to the large one on the anterior aspect.

Was ordered to have the sores dressed with carbolic oil (1 in 40), to have a daily allowance of 4 ounces of port wine, arrowroot, and beef-tea. She has, in addition, an ulcer on the dorsum of left hand, about the size of a half-crown piece, and possessing the same character as the sores on leg. The parts remained in the same condition, and on the 12th July, 1870, patient was placed under chloroform, and the left leg was removed by *amputation through the knee-joint.*

The *anterior* incision was commenced about the middle of the outer condyle of the left femur, carried forwards, and then inwards, so as to describe a long semi-lunar flap, and terminated at the corresponding point of the *inner* condyle. This semi-lunar *skin* flap was then dissected carefully up to the articulation, which was entered at once by section of the ligamentum patella, the condyles of the femur being still further freed from their ligamentous attachment. A short thick muscular posterior flap was cut by passing the knife behind the head of the tibia, and cutting forwards and downwards close to the bone (this flap including the popliteal vessels and nerves). The structures entering into the formation were all found (apparently) healthy. The patella did *not* retract, and was left *in situ.* The condyles of the femur too were not deprived of their incrusting cartilage, but left entire. Very little hæmorrhage, arterial or venous, attended the operation, the femoral being commanded by a tourniquet, and the hands of an assistant.

The vessels in the posterior flap having been secured, the whole face of the stump was smeared over with carbolic oil (1 in 10), the edges of the wound brought together by silk sutures, and a thick fold of lint dipped, in the same carbolic solution, laid over the edges of the wound.

The patient vomited a little during the operation, but otherwise did well.

On July 15 the stump was dressed for the first time, 72 hours after the operation. There was a good deal of healthy discharge, purulent in character, in the dressing removed. The parts were bathed with water and weak carbolic lotion. The edges of the flaps had united very healthily at the upper angles on both sides, and partially also lower down at about the centre flap. Two silk sutures were removed. A portion of the flap at its lower margin, and a little to the left of its centre, was discoloured, livid and purplish-looking. The ligatures seemed to be holding firmly. The stump was re-dressed with lint and carbolic lotion. On the 17th all the sutures were removed, and the stump supported and covered by lint dipped in tepid water, with solution of permanganate of potash. Some slight sloughing of the lower border of upper flap, on the 19th, for the extent of 2½ inches, and about one inch in length. On the 21st, patient looked well and cheerful; the slough has come away; one of the ligatures also; stump dressed as before. On the 23rd, a second ligature came away, and another on the 25th, only one now remaining. The ligature from the "femoral" came away on the 30th. On the 10th August, wounds healing rapidly, patient is allowed up to-day for two hours. She continues to improve; but an ulcer on left hand, and on the dorsum of right foot, caused some trouble for a time. On the 10th February, 1871, she was discharged from hospital and sent to Warley with her husband to join the regiment, the 1st Royals.

She had a very symmetrical useful stump, and could bear firm pressure all

over it. The stump was most satisfactory, and the artificial leg was easily adapted. There was no wasting or atrophy of the thigh muscles, which, on measurement, were equal to the sound one.

This operation, disarticulation of the knee-joint, where, when sound, the cartilages of incrustation on the end of the former, and on the patella are not interfered with, is very different from the operations described by Syme and Carden as amputation, through the condyles of the former removing, more or less of that bone, and as a rule taking away the patella also.

Dr. Markoe, an American surgeon, who has had considerable experience in the matter, claims the following advantages for disarticulation of the knee :—

1. The useful character of the resulting stump.
2. The small shock attending the operation.
3. The lessened section of the tissues.
4. The non-exposure of the muscular interspaces, and diminished risk of suppuration in the thigh.
5. The comparatively few vessels requiring ligature.
6. The attachments of the thigh muscles being mainly preserved.
7. The absence of muscular retraction.
8. The diminished risk of osteo-myelitis and exfoliation, from the femur not being sawn across.

All these advantages were borne out by the case now recorded.

*Case* 3.—*Excision of right Elbow-joint.*

Drummer S. H., 1st Battalion 5th Fusiliers, aged 28 years, 14 years' service, one of which was in Mauritius, and three in India.

In 1861, whilst under treatment for secondary syphilis, this man was attacked with periostitis of right radius and ulna, and ultimately the elbow-joint became engaged.

From this attack, however, he recovered to an extent compatible with the performance of all his regimental duties, and remained so until November 1868, when pain and tenderness set in in the elbow-joint, which advanced to suppuration, the result of which was a firmly anchylosed joint, for which he was invalided.

Patient arrived at Netley on the 1st February, 1870.

After careful examination, it was found necessary to resect the joint; the operation was performed on the 17th February by a single straight incision. There was a little difficulty experienced in operating, in consequence of the firm anchylosis of the joint.

A good deal of bone was removed from the radius and ulna, and from the end of humurus. There was a small quantity of pus in the joint. The bones were found diseased, being much thickened, irregular, and nodulated, and the articular surfaces completely denuded of their cartilage.

With the exception of a slight attack of pericarditis, the case progressed favourably, and on May 31st the man was discharged from the service with a very useful limb, having excellent motion of the joint in every respect.

In the cases of resection of elbow treated here, no splints of any kind have ever been used in the after treatment. The limb is laid on pillows in a semi-bent position for about a fortnight or three weeks, and as the healing process progresses passive motion is gradually and carefully carried out.

This mode of treatment has been found successful, and the condition of the joints, after healing had taken place, showed that the use of splints in the after treatment of resection of the elbow-joint is unnecessary—at least, such is my experience from the cases operated on here.

*Case* 4.—*Lithotomy.*

Private M. G., 1st Battalion 60th Regiment, age 25. This patient, a healthy looking young soldier, belonging to the 1st Battalion 60th Rifles, quartered in Canada, the regiment was ordered to the Red River, and the patient being a bandsman was left at the depôt at Ottawa, on or about the 16th March, 1870. On rising from bed in the morning, he found he could not pass his urine, and suffered from pain in the loins when straining to do so. The difficulty of passing water, and the pain continuing, he was admitted into hospital on the

23rd June this year, and submitted to treatment for disease of he kidneys On marching out, although he micturated freely, a considerable quantity of blood passed with the urine. On his return he was invalided from Ottawa on the 30th August, and Quebec on the 1st September, arriving in England per transport "Tamar," on the 16th, when he was admitted into the Royal Victoria Hospital, Netley.

On admission to Royal Victoria Hospital, Netley, he complains of pains in the loins, great difficulty in passing his urine, frequently in small quantities, with great straining. On the introduction of a sound into the bladder, a rough stone was distinctly felt. On examination of his urine under the microscope, pus-cells, epithelium, and spermatoza were found. By testing, it was found loaded with phosphates.

*October 2nd.*—Complains of being obliged to pass urine every five minutes, especially at night. R. Pulv. doveric, grs. v; ext. hyoscyam, grs. v.; misce. fiat pilulæ, ij. To be taken at bed-time, and repeated every night.

*October 6th.*—Passed a No. 10 catheter; the position of the stone is changed, and he passes urine without much difficulty.

*October 10th.*—Passed a No. 11 catheter; he is much the same.

*October 15th.*—Passed 12 sound with ease.

*October 28th.*—Since last date he has complained of some pain during micturition along the urethra. To-day he parted with a large quantity of highly offensive urine, of a dark yellow colour. He was ordered a diuretic mixture.

*November 1st.*—The laternal operation for lithotomy was performed, and a hard calculus (oval), weighing more than three ounces, was extracted. Some hæmorrhage occurred, which soon abated.

*Vespere.*—Progressing well; ordered a saline mixture every six hours, and one grain of morphia in pill.

*November 2nd.*—The wound looking healthy; passed a good quantity of urine this morning.

*November 3rd.*—Pain in abdomen, increased on pressure; to have warm fomentations.

*November 7th.*—A slaty hue about the wound; in other respects pregressing favourably; all the urine passed by the cut; tongue clean; pulse, 80; temperature, 99°.

*November 13th.*—Going on well; some urine passed by urethra for the first time this morning; pulse, 80.

*November 16th.*—No urine passed by urethra since last note; bowels confined; to have haust. ol. ricini.

*November 17th.*—Small quantity of urine passed through urethra.

*November 19th.*—Passed a considerable quantity of urine through urethra.

*November 25th.*—Still passing a good quantity of urine by urethra.

*December 3rd.*—All the urine passed yesterday through the wound from the upper part; bowels very confined; tongue dirty; to have a couple of cathartic pills followed by ʒij of sulphate of magnesia.

*December 5th.*—Improving slowly; more urine has passed by the urethra the last 24 hours; urine is still acid and loaded with urates.

*December 7th.*—Sat up for the last two days for an hour or two; very little urine has escaped from the wound; bowels very constipated, not relieved but by purgative; pulse weak, 94; tongue brown and dirty; to have R. ext. nucis vomic, gr. ½; aloes, grs. 2; hyocyam, gr. 1; ferri sulph., grs. 2; fiat pilula. One to be taken each night.

*December 8th.*—Urine came through the wound in the evening.

*December 10th.*—The urine flows partly through the wound, and partly through the urethra; urine very acid, and containing urates and mucous.

*December 19th.*—Not quite so well; has had a good deal of pain over the bladder when making water; slept little: ordered sedative draught.

*December 20th.*—Better this morning, the pain having passed away; the urine came entirely by the wound last evening. Ordered the following R.:—Tinct. ferri. perchlor, ʒij; infus. quassia, ʒxij; misce; ʒj ter in die.

*December 22nd.*—Urine passing almost entirely by the wound, which is now only a fistulous opening.

*December 27th.*—Had a rigor this morning; pulse, 130, very weak; no pain anywhere; to have quinine, 5 grs. ter. die. Omit the iron mixture.

*December 28th.*—Febrile attack passed away; passed about six ounces of acid urine by the urethra; urine very acid and loaded with phosphates.

*December 30th.*—Much the same; the bladder was injected to-day with lukewarm water, and a solution of dilute nitric acid, ʒij to ʒxx.

*January 1st*, 1871.—Going on well; the urine is clearer, and contains fewer phosphates; the injection of dilute nitric acid repeated each morning; was given dilut. nitro-muriat. acid, ʒiv.; infus. chirattæ, ʒxij.; misce; ʒj ter in die.

*January 13th.*—Very little urine passing by the wound.

*January 17th.*—He is improving in general health, and gaining strength.

*March 2nd.*—The wound is now quite healed; no urine passes except by urethra.

*March 18th.*—Quite well, and discharged to proceed to the depôt of the 1st Battalion 60th Rifles, at Colchester.

*Case 5.—Lithotomy.*

PRIVATE T. M., 2nd Rifle Brigade, age 29.

This man was born in London; is unmarried. He entered the service in February, 1858, and was immediately ordered to India, where he served $9\frac{5}{12}$ years.

His first illness occurred in September, 1858, he states, that while on guard one night at Lucknow, on going to micturate he found no urine would come away.

The more obstruction he experienced the more desire he had to relieve the bladder. He strained violently and felt considerable pain in the bladder and lumbar region. When relieved from duty he went to bed, and in about an hour the urine came away freely. He was quite well next day, and remained so for five years. In 1863 he was again on guard when the urine stopped; he was admitted into hospital at Delhi, and treated for stricture; No. 4 catheter was passed, followed by No. 5 and up to 10, when he was discharged to duty.

He states that he had gonorrhœa only once, and that about twelve months before he enlisted. Both attacks of stricture occurred at night when on guard. He had not another attack until 1867, when, on his way home with the regiment, he was obliged to seek relief at Calcutta Hospital.

Instruments were again passed, and in ten days he was sent to his duty. He came to England and remained well until February 1869. He was in the habit of using a bougie to keep the stricture open. He introduced it one night, fell asleep, and next morning on removing it a portion remained in the bladder. He did not report the circumstance for three months, felt much pain all the time, but particularly on micturition. He was admitted into hospital at Aldershot and catheters passed, but no attempt was made to remove the bougie. He was ultimately sent to the Royal Victoria Hospital on the 26th July, 1869. Treatment has been tonics, nitro-muriatic acid, opium, and hip-baths.

On admission at the Royal Victoria Hospital he did not look very unhealthy; appetite fair; bowels regular; no visceral enlargement; abdomen tympanitic; genito-urinary system abnormal; urine has not yet (29th July) been examined but is thick and rather stringy, passing off very often and sometimes involuntary. Again, when the patient is urinating the stream is suddenly closed. The urethral stricture is near the bulb. The bladder is irritable and holds the broken off bougie, which may at times be felt with the catheter.

*October 6th.*—Up to the date of operation different sized catheters were passed in the hope that the foreign body might be removed by dilatation of the urethra, and subsequent use of a lithotrite, but without success.

*October 8th.*—The patient having been chloroformed, the operation was proceeded with, and having reached the bladder without difficulty, on manipulation a large aggregation of deposit was discovered around the nucleus afforded by the piece of bougie, but on attempting to grasp this with the forceps, the calculus, owing to its loose friable character, yielded to a slight amount of pressure and became broken up into many pieces of a mortar.

like appearance; the larger pieces were removed by the forceps, the smaller by the scoop, and a great deal of detritus in powder, carried away by a stream o warm water introduced by a syringe. The foreign body was also removed in the form of two pieces of gutta percha bougie, incrusted with this calcareous deposit, which was distinctly moulded to the form of the bougie. From the length of time occupied in extraction it was resolved that further attempts should be desisted from, the patient was accordingly removed to bed, and some stimuli administered. It would appear that the patient had suffered from phosphatic deposit in the bladder prior to the introduction of the bougie. There was but little hæmorrhage during the operation.

In the evening the patient exhibited slight febrile symptoms; pulse 100; temperature one degree above normal.

*October 9th.*—Patient appeared easy; complained of no pain; slight fever. The mucous discharge from bladder still continued, mixed with detritus from the calculus, and along with it a little blood.

*October 12th.*—The wound presented a healthy appearance. In the evening a few drops of water came away by the urethra.

*October 18th.*—Patient slept well last night, and since yesterday evening passed by the urethra about 1½ pints of urine; the wound looked healthy. On making a microscopic examination of the urine, the sedimentary portion was found to contain pus corpuseles, also mucus with crystals of triple phosphate, the sp. gr. 1,012, the reaction slightly alkaline.

*October 21st.*—No water now escapes by the wound, the entire quantity making its way by the natural passages; no pain; is comfortable and cheerful.

*October 29th.*—Patient continues to improve and is making rapid progress towards a favourable recovery.

*December 1st.*—Patient complains again of pain in the bladder. The urine is occasionally stopped by accumulation of calcareous matter.

*December 8th.*—Still complaining of pain in the bladder; experiences a scalding pain when micturating; the urine was thick and stringy. He was ordered tinct. hyoscyam ʒij, acid hydrochlor dil ʒj, decoct. pareira ʒx, misce ʒj ter. in die. No 8 cathetra could pass easily, but No. 9 gave much pain and could not be kept in long

*December 23rd.*—Still pain in bladder; urine suddenly stopped by the gritty matter blocking up the passage.

*December 31st.*—No change; patient much in the same condition.

*April 5th*, 1870.—Another stone discovered in the bladder.

*June 6th.*—Patient has recovered perfectly from the last operation, but his old symptoms soon recurred again, and to-day the lateral operation was again performed. The incision was made through the cicatrix of the former one, and after a little difficulty in reaching the staff owing to the great depth of the perinæum, the bladder having been opened a stone about the size of a walnut is grasped. It was so soft, however, that it crumbled up immediately, but the bladder having been tolerably full the gush of urine which followed, assisted by subsequent injections of tepid water completely washed out all the fragments. There was little or no bleeding, and the whole operation including the time occupied in giving chloroform lasted rather less than twenty minutes. During the afternoon the patient had several fainting fits and there was, at three periods, some venous hæmorrhage; but in the evening he was very well. Pulse 100; temperature 98°.

*June 7th.*—Passed a good night; wound looks well; passed water freely (all through the wound), and the urine is free from any gritty sediment.

*June 10th.*—Continues well; passed yesterday a piece of calculus rounded and about the size of a pea; examined under the microscope, found not to be a calculus but an old piece of calcified sponge. It must have dropped out of the sponge which is placed at the wound to catch the urine. This morning the urine has passed almost entirely free from the urethra and the little finger introduced into the wound showed that healing was commencing firmly at the deepest part.

*June 11th.*—Urine now comes again freely by the wound, the edges and tract of which, however, this morning are swollen and covered with a layer of pus, very painful, so much so, especially after making water, that last night patient could get no sleep.

*June 13th.*—Last night edges of wound had a slight erysipelatous blush, and the inflammation had extended to the adjacent parts of the nates on left side; but warm poultices having been applied these appearances have, to a great extent, disappeared this morning.

*June 18th.*—Improving still; hardness and inflammation surrounding wound almost gone. Urine, however, comes by the wound.

*June 24th.*—Urine comes now entirely per urethram; external wound quite free from inflammation and closed up.

*July 4th.*—Continuing well; a slight exuberant condition of one of the walls or lips of wound, touched with cupri sulph.

*August 10th.*—This man continues well, and progresses satisfactorily; passes water freely.

*August 15th.*—Appears now in his ordinary health; spend the day out of bed.

*August 31st.*—Appears quite well; has no complaint.

*September 3rd.*—To be sent back to his depôt as fit for service.

*Case 6.—Removal of Necrosed Bone.*

PRIVATE J. M., 55th Regiment, age 32.

This man was admitted into the Royal Victoria Hospital, Netley, on the 13th May, 1869, having been invalided from India.

His medical history shows the following:—That in 1857 while quartered at Dublin he contracted a venereal sore, which was followed by a specific rash all over the body; but recovered under suitable treatment. In 1863 was sent out to India. He enjoyed good health, until July 12, 1868, when he was admitted into the Military Hospital at Lucknow with two apparently non-specific sores. The glands in left groin soon became affected, one was opened, but discharged little, and three weeks after admission *pain* began to be felt together with swelling, tenderness and puffness in the head of the *left tibia*; leeches and fomentations were applied and an incision made at this spot, which relieved him considerably by giving exit to a fœtid purulent discharge. Dead bone was discovered after the opening of this abscess, and several sinuses subsequently formed all along the front of the tibia which discharged freely. The separation of sequestra had not sufficiently advanced to permit of their removal, and as soon as the patient's general health would allow, he embarked for England on 20th January, 1869.

On admission at the Royal Victoria Hospital, Netley, the whole of left leg was seen to be very much enlarged and swollen, covered with sinuses and ulcerated openings, through which considerable thickening of periosteum and dead bone could be recognized, it was evident that extensive necrosis of the whole shaft of the *tibia* existed. Neither knee nor ankle joint were implicated.

On the 14th of July an incision was made 7½ inches long upon the anterior surface of the tibia at its upper third, and seven or eight pieces of necrosed bone, some already loose, were removed, the rest requiring "gouging" to bring them away. After this, healthy granulations formed along the wound and the discharge improved.

The circumference of the upper ⅓ of the leg before the operation was 14½ inches, three months after (in October) it was found to be 11¾ inches, showing a diminution of 2¾ inches. Limited abscesses about this time began to form at the *lower end* of the bone, and on being laid open led to "cloacæ" at this portion of the shaft, and through these one large and two smaller pieces of bone (necrosed) were removed on the 4th of November. After this date patient's condition became very critical, much profuse discharge from the limbs; but under generous diet, &c., he somewhat improved.

The bone continued to loosen and the patient's condition being favourable on the 1st of March, 1870, he was placed under chloroform, and again operated on.

The anterior surface of the tibia having been freely exposed by a long incision, the necrosed shaft was divided by a small trephine and removed in three separate pieces, forming the entire length of bone from epiphysis to

epiphysis. The cavity was then well stuffed with lint, soaked in carbolic acid lotion and the limb supported on a pillow.

The patient has continued to do well ever since the operation, and his condition, two months after operation, was as follows:—

The left leg presents on its anterior aspect three large and deep longitudinal openings, communicating with the shell of new formed bone. The edges of these openings are granulating healthily. The integument and subcutaneous tissue of the whole limb are thickened, brawny looking, and very firm. The discharge from the bone is very small and is becoming scantier.

The consolidation of the new shaft of bone appears to be considerably advanced, the patient is able to get about with the aid ofcrutches with ease, and bear a good deal of weight on this (the left leg).

Its measurements are as follows:—

(1.) *Length* from head of tibia to inner malleolus 16·25 inches.
(2.) *Circumference* at *upper* third of the leg 13·25 inches.
(3.) *Circumference* at *middle* third of the leg 11·12 inches.
(4.) *Circumference* at *lower* third of the leg 10·50 inches.

Corresponding measurements of the *opposite leg* are:—

(1.) *Length* from head of tibia to inner malleolus 16·0 inches.
(2.) *Circumference* at *upper* third 11·50 inches.
(3.) *Circumference* at *middle* third 11·0 inches.
(4.) *Circumference* at *lower* third 8·50 inches.

This shows an excess in length of ·25 (¼ of inch) of an inch in the left leg as compared with the *right*, and the transverse measurements are also slightly greater, owing to the thickened condition of the tissues surrounding the bone. The movements of the knee and ankle joints remain perfect.

Patient was discharged home 24th of August, 1870, having a fair use of the limb.

*Remarks on the Cases of Stricture treated during the period included in this Report.*

During the period from 1867 to 1870, both inclusive, the total number of cases of stricture of the urethra admitted were 116. Of these 78 were sent to duty, and 27 cases were found unfit on account of various other complications besides stricture. Of the 78 sent to duty, 20 of the worst cases were treated by Holt's method with very satisfactory results, 11 were treated by Thompson's dilator. and did well, and in 8 cases it was found necessary to resort to internal division with Tralat's instrument. The strictures in these latter cases were of the annular form, and were situated in the penile portion of the urethra, and just anterior to the scrotum.

My experience leads me to the conclusion that strictures situated anterior to the scrotum are more satisfactorily dealt with by internal division than any other mode of treatment.

Two deaths are shown under stricture of urethra; in one of these cases death resulted from extensive disease of the kidneys, and is detailed in Case 8 for 1868; the other death was a man of the Royal Engineers sent here from Aldershot, who had been previously 276 days under treatment. On admission here he was so completely broken down from the result of several urinary fistulæ in the perineum and scrotum, through which urine passed freely, that he was not in a condition for any operative interference. No. 6 catheter could be passed easily. The patient died on the 17th October. The post-mortem showed extensive disorganization of the kidneys.

## APPENDIX No. X.

### No. 1.

### TABULATION OF CASES FROM THE NECROLOGICAL REGISTER OF THE ROYAL VICTORIA HOSPITAL, NETLEY,

With slight Explanatory Remarks.

By Staff Assistant-Surgeon F. H. Welch, F.R.C.S., Assistant Pathologist.

#### (*a.*) Syphilis.

*General Observations.*—The scope of this and succeeding papers is to arrange in comprehensive tables, under their respective headings, the isolated cases scattered throughout the pathological records of the Royal Victoria Hospital, Netley, as a contribution to the morbid anatomy of the more important chronic diseases producing loss, from deaths and great invaliding, in the British Army, in the hope that they may assist somewhat in the elucidation of the causes and phases in operation in the human body productive of structural changes incompatible with life, and may tend to suggest preventive and remedial measures.

It is to be observed, that these illustrations of morbid anatomy are derived from the invalids arriving from *foreign service*, and thus originating under every variety of country, climate, and phenomena influencing health thereon dependent; and under the special circumstances of military life.

Arranged in the order of numerical frequency the deaths stand as follows:—

| | Per cent. |
|---|---|
| Phthisis pulmonalis | 49 |
| Heart and vascular system | 17 |
| Syphilis | 16 |
| Chronic dysentery | 5·4 |
| Nephria | 2 |
| Scrofula (embracing secondary tubercular phthisis) | 2 |
| Malignant growths | 1·2 |
| Parasitic | ·8 |
| Diabetes | ·8 |

the remaining 5·8 percentage being composed of several lesions small in importance as regards numbers.

From this table it is seen that a complete accord exists in the chronic diseases of *foreign service*, and the causes of mortality in the army *at home*, detailed in "Practical Hygiene," p. 534, in respect to the more important items, viz., of the chest—phthisis, and lesions of the heart and vessels; demonstrating the causation of both to be intimately bound up in the soldier and his surroundings, as powerful at home as abroad, and up to the present time apparently inseparable from his calling. Next in frequency is syphilis, assuming but a small proportion in death causation on home service; no doubt underrated, the lesions resulting and producing death appearing under local classification independent of the general cause. The majority of invalids being from India explains the prominence of dysentery. The accordance between the diseases fatal in the army *at home*, and those of a chronic nature causing death in the *foreign segment* in the two most important items is very marked; and taking into consideration the minor variations, a tabulated series of the Netley records may be assumed a fair exponent of the morbid anatomy of the

chronic diseases causing death and vast invaling in the *Army as a whole*, and elucidatory of the lesions thereby produced.

But while pointing out how frequently the apparently local lesion of life is found after dissolution to be but one prominent exponent of a general cause, yet often, with all the assistance the scalpel affords, the difficulty of harmonizing the immediate cause of death with the true pathological sequence of events is manifestly very great, especially when a rational dovetailing of the original constitution, the special diatheses engrafted on it, the prior history of disease, the prominent symptoms characterizing the last illness or immediately anterior to dissolution, is attempted with the departures in the various viscera from an healthy standard brought to light by a careful post-mortem examination. To elucidate in one set of lesions an engendering quality inseparable from the individual organism and transmitted by descent,—in another, an engrafted virus,—in a third, an essentially primary local origin with subsequent system contamination and visceral implication, or secondary lesions derived from the primary by mechanical transference,—and when one or other of these is in combination, to differentiate the mass of observed lesions into each separate channel of causation—to work out accurately the pathology—is indubitably an onerous task, but one which must be encountered if the dearly bought experience of the dead-house—the profound organic changes in the viscera uncontrolled in their death potency by therapeutics—is to form a solid foundation upon which to erect, the origin, the phases of working through which the body passed to deterioration and dissolution, and hence to devise prevention, or if not that, at least to increase the probability of successfully combating disease by a knowledge of the general laws and the sequelæ to be anticipated.

As exemplified in this present and the subsequent series, nothing is more manifest than the remarkable multiplicity of organic lesions in the individual body, so opposed to the conception of disease as an unit; such a complexity of associated abnormal structure, indicating the mutual interdependence of the different viscera comprised in the animal frame; and whether we regard them as directly the resultants of the disease terminating in death, or as marks or sign-posts exponent of prior extinct morbid action, the astonishment is centred in the possibility of life in conjunction with such numerous radical organic defects demonstrable by our present rough methods of analysis.

As will be observed, each case is preceded, when possible, from the presence of authentic details, by a short historical summary of the age, service, prior diseases, and fatal lesion, with its origin, duration, and prominent symptoms; also the duration of last hospital admission as elucidatory of any probable modification of observed recent lesion by medicinal action; thus a comparatively full idea of the conditions and phases of diseased working through which the individual passed, from the time of entry into the Service with all the requisite physical capacity of a recruit to his death, is arrived at for the explanation of the varied lesions detailed in the post-mortem inspection under the several headings. Of the diseases prior to enlistment no record ought to be necessary, it being supposed that an healthy frame above the general standard is present; but it must be remembered that "the history of disease in "sequence" includes only the last decennial period of service in those above ten years (the medical history sheets not being generally in use prior to that date, and not taking cognizance as a rule of prior illness),—nor does it enter on minor ailments, but embraces the more important diseases causing hospital admissions and probably determining the observed lesions. The possibility of a disease having been incurred without appearing in the returns must also be recognized, a fact not to be lost sight of, especially in those too numerous cases where the visceral defects displayed post-mortem indicate a prior action of the venereal virus not comprised in the historical summary.

Taking these instances of death collectively, we have *chronic diseases* proving fatal in the Army at an average age of 29·3 years with an average service of 9·07 years, a pregnant fact in a chosen body of men and excluding the mass of like lesions dispersed among the civil community by invaliding. It seems clear that there are conditions in the Army constantly present inimical to longevity as compared with the civil element in spite of all the counteracting hygienic appliances hitherto in operation.

With these general explanatory details it is necessary to commence the series, premising, that the individual cases are left as far as possible to depict their special peculiarities, and that the appended remarks enter but slightly on the subject, being intended merely to assist in furthering inquiry by giving a general sketch of each class so far as here illustrated and by collecting under each heading the isolated examples of special lesions and degenerations scattered indiscriminately throughout the whole bulk of post-mortems.

*Special Remarks.*—Forty-one cases of the enthetic disease are tabulated—one primary, 40 secondary, the diathesis in the latter being strongly present during life, and the immediate death causation—specific visceral involvement, or other disease engrafted on the debilitated frame.

The arrangement of the cases of secondary disease is in accordance with the local lesion determining death as follows:—

1. Erysipelas of the scalp from subjacent cranial disease; case 2.
2. Exhaustion in association with bone necrosis and suppuration; cases 3, 4.
3. Lesion of the brain or membranes; cases 5–13.
4. ,, lung; cases 14–17.
5. ,, aorta and valves; cases 18–21.
6. ,, liver; cases 22–26.
7. ,, liver and spleen; case 27.
8. ,, kidneys; cases 28–33.
9. Erysipelas engrafted on specific lesions, pulmonary apoplexy (embolic); case 34.
10. Exhaustion from associated syphilis and intermittent fever; case 35.
11. Dysentery engrafted on syphilis; cases 36–41.

In numerous other instances also is the influence of the virus discernible, not figuring in the present series on account of the specific lesions observable post-mortem playing but a subordinate part in the production of death, and obscured during life by graver defects of an alien nature under which they are necessarily classified; embracing these, no less than 46·2 per cent. of the total deaths at Netley Hospital illustrate one or more lesions due to the syphilitic poison.

The difficulties of adapting the mortality nomenclature to the true pathology and morbid anatomy of the diseased frame is more especially apparent under this class, partly on account of the often slightness of the illness of an alien nature directly causing death when engrafted on the specifically debilitated body,—partly from the marked prominence and importance of the local manifestation, the history of impregnation and sequence of diseased action being obscure or doubtful during life,—partly from the great difficulty of assigning to each structural defect its proper value when this virus is commingled with other textural changes,—and partly from the doubt still cast upon the relation of certain ascribed special lesions, *e.g.*, aortic degenerations.

The average death age in this series is 29·5 years—extremes, 21, 40; average service, 9·6 years—extremes, $3\frac{1}{12}$, 23; the majority contracted on foreign service; with an average period from the primary sore to death in the accurately ascertained cases of four years, ranging from eight months to 20 years. There is but little relation apparent between the duration of the disease and the numerical visceral implication as exemplified in a comparison of Cases 34, 39, with those of longer duration, 4, 10. The symptoms associated with the last illness are very variable in accordance with the viscus mainly implicated—emaciation, anæmia, cachexia, constant. A plurality of lesions is markedly the rule, but few tissues or viscera escaping. The relative frequency of the lesions in the several regions of the body, and their nature, are based upon the facts brought to light in 88 cases, and shown in the following analytical table:—

| | | Per cent. |
|---|---|---|
| Vascular system | Atheroma of aorta | 55 |
| | „ endocardium | 3 |
| Viscera | Ulceration of tonsils | 37 |
| | „ tongue | 25 |
| | „ pharynx | 7 |
| | „ larynx | 7 |
| | Hypertrophy of tongue papillæ | 14 |
| | Glandular enlargements (especially thyroid) | 22 |
| | Gummata in liver | 31 |
| | Cicatrices and loss of liver substance | 29 |
| | Deposits in lungs | 31 |
| | „ testicles | 29 |
| | „ spleen | 18 |
| | „ kidneys | 3 |
| Cranium | General thickening of bones, with obliteration of diploe | 40 |
| | Isolated cicatricial loss of substance of bones | 11 |
| | Necrosis of bones | 3 |
| | Ulceration of bones | 7 |
| | Porosity of bones (especially inner table of skull) | 29 |
| | Gummatous nodes | 22 |
| | Exostoses (inner table) | 3 |
| | Adhesions of dura mater | 18 |
| | Yellow discoloration of dura mater | 3 |
| | Thickening „ | 11 |
| | Hæmatoma „ | 7 |
| | Laminated bone formation „ | 3 |
| | Opacities of arachnoid | 14 |
| | Gummata in brain substance | 11 |
| | Local contraction and loss of convolutions of brain | 3 |
| | Local softening of tissue | 18 |
| | Abscess | 3 |
| Framework of body | Necrosis of nasal bones and cartilages | 7 |
| | Hypertrophy of bone (sternum, tibia) | 11 |
| | „ cartilage (ribs) | 3 |
| | Ulceration of cartilage (sterno-clavicular) | 3 |
| | Softening „ (ribs) | 3 |
| | Gummatous nodes (patella, tibia, sternum, forearm) | 14 |
| | Necrosis of bone (clavicle) | 3 |
| | General porosity of bones of skeleton and thinning of compact portion | 3 |
| | Inflammatory action (sternum) | 3 |
| | Fragility of ribs (very marked) | 3 |
| .. | Enlargement of joints (elbow and metacarpal) | 6 |

Associated with the specific lesions were the following textural changes :—

| | Per cent. |
|---|---|
| Lardaceous disease of the kidneys | 33 |
| „ „ liver | 33 |
| „ „ spleen | 22 |
| „ „ intestines | 25 |
| „ „ cranial bones | 7 |
| „ „ stomach | 3 |
| „ „ pia mater | 3 |
| Hypertrophy of cellular tissue elements in liver | 18 |
| „ „ kidney | 11 |
| „ „ spleen | 7 |
| „ „ pancreas | 7 |
| Cystic degeneration of kidney | 3 |
| Abscess „ | 3 |

Thus the accompanying deteriorations are the lardaceous substitution and the fibroid, and whether we regard them as due essentially to the syphilitic virus or as sequelæ common to it and other diseases, their importance in the impairment of functions necessary for the continuance of life cannot be gainsaid. A comparison of the instances of lardaceous disease scattered throughout

the entire records with varying structural defects gives an enormous preponderance to the syphilitic virus, and notably in the three first viscera.

Case 1 of primary syphilis exemplifies systemic infection, with absence of local induration. A soft sore on the perpuce, followed by bubo and sloughing in an intemperate man, the local results being a communication with the bladder beneath Poupart's ligament and a laying bare of the femoral vessels and subjacent muscles, death ensuing from hectic and exhaustion; the formation of secondary multiple abscesses being apparently prevented by occlusion of the vein from outward strangulation and not internal thrombus. The induration of one gland, in opposition to its absence in the sore, in the midst of the sloughing mass in the right groin, and the same condition of the right lumbar chain is observable in demonstrating the systemic infection which is apparent also in the tonsils, frontal bone by commencing porosis, and aorta by end-arteritis and atheroma.

Of the cases comprised under secondary disease, specific lesions of important viscera are seen to be the major cause of the mortality, the brain and membranes heading the list, both in numbers and importance, followed by the renal organs. The propriety of placing cases 34–41 in the same series with the former may, at first sight, be questioned, yet the major influence of the specific structural deteriorations in the death causation necessitated it, while in reference to dysentery a specific form of it seems highly probable (Aitken). Of the cerebral lesions, the great variety of the symptoms and the fluctuations in their persistence and course is very marked, in this respect apparently differentiating the specific forms, and suggesting points of diagnostic value. Individualizing the cases we have—motor paralysis, loss of temperature, muscular atrophy, and articular pains, *left* side, with an old apoplectic clot between the *right* central ganglia, hæmatoma of dura mater *left* side, general thickening of bones, and diseased state of vessels; *left* hemiplegia and convulsions, *right* hemicrania, and general constitutional disturbance, from abscess in anterior lobe of *right* cerebrum; *right* facial neuralgia, followed by lateral paralysis, progressing gradually to all the extremities and defective articulation, with cavities in *right* optic thalalmi from softened gummata, and nodules in pons varolii; *right*, loss of motor control, tonic muscular contraction, loss of speech and power of swallowing, epileptic fits, with loss of substance of convolutions *left* cerebrum and degeneration of vessels, three superficial cavities in *left* anterior lobe, and a gummatous nodule beneath *right* central ganglia; *right* hemiplegia followed by coma, with lesions of the bones, membranes, and convolutions, superficial but generally diffused; in Case 10 extreme variability and intermission of symptoms, referable to defects of *right* motor control, loss of intellect, and *left* hyperæsthesia, with *general* bone lesion and gummata in *left* cerebral hemisphere; imbecility, helplessness, atrophy, and tonic contraction of upper extremities, *right* lateral diminution of temperature followed by relaxed sphincters, with *general* bone lesion, destruction and gummata in central ganglia, and especially *left* corpus striatum, and general softness of brain substance from embolic transference from diseased aorta to the right internal carotid and left vertebral arteries; *right* hemiplegia with great bone disease and gummata in optic thalami, more extensive on *right* side; loss of speech, hyperæsthesia of lower limbs, absence of motion and sensation, *right* side (except the thigh and leg), with rigidity and abduction of the right leg before death, with extensive bone lesion, compression of brain surface from formation of bony laminæ in dura mater, and thrombosis of *left* middle cerebral artery.

A glance at the extent and range of visceral implication will render it easy to understand how often lesions of the brain, lungs, abdominal viscera and aorta may be due to the specific virus yet frequently regarded merely as local deteriorations unless their dependence on a general cause in conjunction with other textural changes of a like nature be elucidated post-mortem. The oft impossibility of obtaining a clear record of primary infection and subsequent evolution of the phases of secondary disease, together with the comparatively recent elucidation of the true nature of many of these lesions go far to explain this deficiency. In the Army statistics this is more especially apparent as regards the liver and kidneys, numerous cases of the former classified under "chronic hepatitis" and "hepatic enlargement" demonstrating lesions

acknowledged specific, while in the case of nephria the frequency of the fibroid and lardaceous changes in sequence to virus infection is apparent in the high percentage of both. When to the vast temporary inefficiency in the service from the primary malady is added the secondary results in the viscera as displayed in these 41 cases, and the mortality and invaliding therefrom resulting, its importance cannot be over-estimated. The more the pathology of the local diseases is advanced the more prominent in causation becomes this potent preventable virus, and the greater the demands for its extinction, or at least limitation, by all available means. As before stated, in the Netley deaths no less than 46·2 per cent. demonstrated clearly one or more specific organic changes. Let the ill-health and wretchedness, the curtailment of service and life of this small segment be considered with a view to a conception of the actual specific lesions hidden obscurely in nosology under "local disease," the amount of sickness, invaliding, death, and how imperative becomes its suppression! As remarked by Dr. Aitken, and amply illustrated in these examples:—"A history of syphilis in soldiers is too often the starting point of a "fatal disease. The impairment of the health takes its origin from the date "of the infecting syphilitic sore. Early implication of the lymphatic glands "leads to impoverishment of the blood as an immediate result, and then to "the degeneration and wasting of tissues, which attends the general cachexia, "and which eventually terminates in death, with complicated and varied "lesions, especially implicating the internal viscera."*

Looking a little more carefully into the relative frequency and nature of the organic lesions, it will be observed that the so-called atheromatous degeneration of the aorta heads the list, so important in connection with aneurism, one of the most common of the diseases of the vascular system among soldiers and in reference to death causation bearing a proportion "of a little more than "half in the total mortality from diseases of the heart and vessels in the "British Army at home during 1859–66."† and no less conspicuous in the foreign element. The degeneration is here placed as one phase of the specific virus in accordance with the views generally held by Army Medical Officers, and substantiated by the data of these post-mortems. If we look throughout the whole deaths, this aortic lesion is depicted in 57 instances as follows:—

| | Instances. |
|---|---|
| With a clear syphilitic history .. .. .. | 34 |
| Highly probable „ .. .. .. | 4 |
| No history .. .. .. .. .. | 1 |
| With phthisis .. .. .. .. .. | 8 |
| „ heart lesion .. .. .. .. | 7 |
| Various other diseases .. .. .. .. | 3;— |

thus accompanying syphilis in a percentage of 59·6, in the highest other lesion 14·2. In point of severity the same feature is apparent, and next to syphilis, the only other diseases with which it is at all extensive are the local ones of the heart and lungs. Inasmuch as the greater interest of the lesion is centred in its ulterior results, a consideration of the subject in reference to aneurism is postponed to that heading. The naked eye characters and microscopic elements of this end-arteritis, and its sequel, are graphically depicted in Staff-Surgeon Davidson's brochure,‡ and need no detailing here, the process not varying but in minor matters of locality from the syphilitic nodule stages elsewhere.

Next in frequency are the ulcerations of the tonsils, tongue, pharynx, and larynx, with the gummatous formations in the viscera, the liver and lungs heading the list. These gummata, originating in proliferation of the cellular tissue elements, forming semi-transparent nodules consisting of oat-shapen and spherical cells in a fibrillated matrix, produce (as the series exemplifies) atrophy of the normal elements among which they are cast, and undergoing a fatty degeneration are met with, as a cheesy mass,—exemplified in the testicles; associated with softening of the surrounding tissues—as in the brain; expelled,

* "Science and Practice of Medicine," vol. i., p. 860.
† "Parkes' Hygiene," p. 534.
‡ "Army Medical Blue-Book," vol. v., p. 481.

leaving a cavity—as in the lungs; or absorbed, leaving a depressed cicatrix, with loss of substance, so frequently illustrated in the liver: the normal cells and vessels surrounding them often betraying the lardaceous change.

The cranial bones and contents are very conspicous, the former being one of the earliest involved of the internal structures. We observe, singly or conjoined—a general hypertrophy of the osseous elements leading to an ivory-like denseness, an eburnation, an obliteration of the diploe, common to the whole skull, or localized; exostoses; the formation of surface gummata—nodes,—or infiltrating the entire bone, leading ultimately to thinning, porosity, and cicatricial loss of substance; occasionally an ulceration process is met with, or local death. It is to be noted, the preponderance of these lesions in the frontal bones, and the lateral symmetry displayed by the general cause. Of the membranes, the dura mater is mainly implicated, showing prior sub-acute inflammation, discoloration of its tissue, laminated hæmatoma, and formation of bony plates; the arachnoid displays opacities, augmented fluid; and the pia mater an excess of vascularity, associated with pacchionian gland enlargement: a diminution of diseased action from without inwards, and suggestive of a departure from the bony texture. In the brain substance are to be observed circumscribed loss of substance of convolutions, especially of the anterior lobes, and contraction—no doubt consequent on pre-existent gummata; the presence of gummata adjacent to the surface, or in the central ganglia; brain softening; abscess; atheroma of the smaller vessels and clot; lardaceous disease of the pia mater and vessels of the bones.

Of the framework of the body, the skeleton, much the same lesions are found as already depicted with the cranium—general softening of tissue and thinning of the compact texture; general and local growth; gummata; caries; necrosis; with hypertrophy, softening and ulceration of cartilage; notably is the lesion in point of frequency in the sternum and costal cartilages.

In the distribution of syphilitic lesions in the individual bodies, features to be remarked are; the regional variation of severity, a viscus entirely escaping in one case though severely implicated in another; a tendency to localization, as though while free to attack and originate in any quarter, yet in the production of a grave textural disorganization in one region, a disarmament throughout the system generally of the virus power is brought about for at least a temporary period.

With these general remarks upon the group, the tabulated series of cases of syphilis are as follows:—

| No. of Case. | Age. | Years of Service. | Details of Service in sequence. | Previous History of Disease in sequence. | Where Primary Lesion contracted. | Duration of Lesion. | Duration of last Hospital Admission. |
|---|---|---|---|---|---|---|---|
| 1 | 37 | 18 4/12 | England .. 3<br>Crimea .. 1 1/12<br>England .. 7<br>India .. 7 8/12 | Ophthalmia<br>Ulcers<br>Primary Syphilis | Allahabad | 15 1/2 months | 7 3/4 months |
| 2 | 24 | 8 | .. .. | Primary Syphilis<br>Intermittent Fever<br>Secondary Syphilis<br>Erysipelas of Scalp | ? | ? | ? |
| 3 | 36 | 10 3/12 | Mediterranean, 4 7/12<br>India .. .. 5 6/12 | Malarial Fever<br>Syphilis, Primary<br>Syphilis, Secondary<br>Necrosis and Abscess | India | 626 days | 3 months 8 days |
| 4 | 36 | 23 | ? | Primary Syphilis<br>Hepatic Enlargement<br>Secondary Syphilis (3 admissions)<br>Caries of Nose | India | 20 years of Syphilis<br>232 days of Caries | ... |

| Predominant Symptoms characterizing last Illness. | External appearance. | Cranium, Spinal Canal, and Contents. | Neck, Chest, and Respiratory Organs. |
|---|---|---|---|
| A soft sore appearing day after connexion on inside of prepuce. Neglect, and irritation from friction of clothes; bubo; sloughing; discharge of urine from the open bubo consequent on communication with bladder beneath Poupart's ligament; œdema of the lower extremity (right) on which the sloughing sore exists; hectic, exhaustion, death<br>Habits, intemperance; no prior history of syphilis | Great emaciation; œdema of right lower extremity from the hip downwards,—of the left below the knee. A ragged mass of phagædenic ulceration in right groin, 4 inches in diameter, extending into iliac fossa and into pelvis, communicating with bladder, passing also beneath the femoral vessels and laying bare the muscles, eroding the pubic crest. Small mass in left groin. Under surface of penis and prepuce ulcerated (original sore): an indurated gland lay free in the right groin ulceration | Calvarium over the left temporal region thickened as compared with the right; great vascularity of the diploë. Two slight patches of porous erosion on inner table of frontal bone on the left; corresponding to these on the right are opacities with pin-head points of vascularity; pacchionian glands much enlarged. Great vascularity of dura mater along the longitudinal sinus. Sub-arachnoid fluid greatly increased over the superior portion of middle and posterior cerebral lobes. Slight opacity of arachnoid and vessels of the pia mater much congested | Mucous membrane of larynx vascular; small opaque patches stud the inferior vocal cords<br>Slight pleuritic adhesions at right apex; extensive recent adhesions over the left with slight effusion<br>Small cretaceous nodules at the anterior edge of upper lobe of the right lung |
| .. .. | Œdema and thickening of scalp tissues | Gummatous deposit in frontal bones on each side, with increase of bony texture extending into orbits; membranes of brain adherent, generally congested, with thickening of dura matter and opacity of arachnoid; texture of brain, normal | Swollen condition of textures around the root of tongue, old œdema of epiglottis; tracheal mucous membrane cyanotic |
| Necrosis of fibula and clavicle; delirium; exhaustion | Girth 32 inches<br>Weight 94¾ lbs.<br>Loss of extremity of penis | Calvarium thickened; loss of substance from two enlarged pacchionian glands; commencing hæmatoma of dura mater; opacity of arachnoid. Brain 3 lbs. 2¼ oz. | Apex of right pleura adherent, recent disease posteriorly. A small isolated nodule in right apex; an abscess at posterior and median portion of lower lobe corresponding to adhesion. Left lung congested; an isolated deposit in apex, and at posterior part lower lobe a large one with puckering of lung overlying |
| Absence of penis from sloughing, with present ulceration; caries of nose; ulcers of throat; exhaustion | Girth 29 inches<br>Weight 105 lbs. | Brain, 3 lb. 1 oz. | Lobes of thyroid greatly hypertrophied; two deep ulcers left side below vocal cords, exposing cartilage; left costal pleura vascular, with 4 oz. of serum in cavity. Small cavity in left apex with pneumonic and purulent secretion from capillary bronchi at base; right lung congested at base, with syphilitic deposits in anterior surface of the middle lobe |

| No. of Case—*contd.* | Heart and Vascular System. | Peritoneal Cavity. | Alimentary Canal. |
|---|---|---|---|
| *1* | Patches of atheroma in ascending aorta. Lappets of aortic valve opaque and thickened at their attachments; a warty excrescence, size of a large pin's head, occupies the free edge of the middle and also the left lappet. Right femoral vessels surrounded by slough. The artery pervious, but its coats are very soft, easily separable, and vascular internally—this condition exists for 1 inch in centre of the sloughs, and above and below the coats are firmly attached to the thickened sheath. The femoral vein, and upwards to the junction of the internal iliac, impervious, a thick fibrous cord; the coats puckered and firmly contracted on a thin black film of fibrine attached strongly to the inner one. The obstacle to sloughing of both vessels appeared the fibroid thickening of the sheath, which by contraction had occluded the vein | Lumbar glands enlarged and indurated on the right side | Glands of the tongue over the posterior half very much enlarged |
| *2* | Semi-decolorized coagulum in heart | .. .. | .. .. |
| *3* | White spots on pericardium | .. .. | Tonsils ulcerated; esophagus at its median portion closely studded with small isolated yellow deposits. Lumbricus in intestines |
| *4* | White patch anteriorly; atheroma of ascending aorta. Weight 8 oz. | 26 oz. of clear serum | Mucous membrane of small intestine anæmic |

| Liver. | Spleen. | Kidneys. | Bladder and Generative Organs. | Joints, Bones and Muscles. |
|---|---|---|---|---|
| 3 lbs. 8½ oz. Outer surface of the right lobe impressed by the ribs. On section, nutmeg. Intra-lobular congestion and fatty degeneration of the circumference of the acinus | 10 oz. Opacities of capsule; glomeruli obvious; lardaceous | The pelvis of the right filled with small uric acid calculi. The cortical substance of both fibroid and fatty, but the right more advanced. The right ureter dilated and thickened as it passed into the pelvis. | Bladder contracted, capacity not over 1½ oz., surrounded by fibroid thickening; very vascular at the base. At the right side of the apex is an ulcerated opening ½ inch in diameter, leading by a sinus with thickened walls of fibroid material beneath Poupart's ligament to the right groin | |
| Enlarged — congestion inter-lobular; texture fatty | Enlarged — soft, and pulpy | Kidneys greatly congested, especially cortical substance, which is coarse and granular | | |
| 4 lbs. 5 oz. Right lobe thickened, with increased convexity of anterior surface; much interlobular congestion; left lobe paler, pigmented here and there; small foci of apparent softening; capsule normal; no loss of substance on surface | 12 oz. Firmly adherent to diaphragm; capsule at this spot, thick, with fibrinous layers, 2½ in. in extent; substance dark chocolate, firm | 17 oz. Capsule adherent; numerous small abscesses, size of pea, in both; one larger situated in pyramidal portion of right | Bladder ulcerated | Sternal end of left clavicle necrosed; abscess in connection with it extending downward beneath pectoral muscles; fibula also necrosed |
| Enlarged. On convex surface numerous depressed cicatrices (remains of absorbed deposit); substance pale fawn colour, anæmic and greasy; fatty degeneration of cells, with increase of connective tissue | 4 oz. Small, firm, glomeruli visible | 1 lb. 2 oz. Capsule separable with difficulty; granular condition of surface; cortical substance pale, increased; epithelium fatty and tubules opaque and granular | .. .. | Necrosis of nasal bones and nasal process superior maxillary; depression of nasal cartilages; periosteal thickening of tibiæ, with deposit of bony matter on right |

| No. of Case. | Age. | Years of Service. | Details of Service in sequence. | Previous History of Disease in sequence. | Where Primary Lesion contracted. | Duration of Lesion. | Duration of last Hospital Admission. |
|---|---|---|---|---|---|---|---|
| 5 | 38 | 21 | Home .. 1<br>Bermuda .. 3<br>N. America 6<br>Home .. 1<br>Crimea .. 2<br>India .. 8 | Syphilitic history<br>Hemiplegia | India | Brain Lesion $1\frac{2}{12}$ years | 4 months 26 days |
| 6 | 21 | ? | Home .. | Hepatitis<br>Syphilis<br>Hemiplegia (left) | Netley | $1\frac{2}{12}$ years | ? |
| 7 | $33\frac{10}{12}$ | $15\frac{11}{12}$ | Home .. 1<br>India .. 13<br>Home .. $1\frac{11}{12}$ | Syphilis, Secondary<br>Rheumatism, Chronic<br>Malarial Fever<br>Cephalalgia<br>Constant Neuralgia<br>Paralysis | ? | Paralysis 13 months | ? |

| Predominant Symptoms characterizing last Illness. | External appearance. | Cranium, Spinal Canal, and Contents. | Neck, Chest, and Respiratory Organs. |
|---|---|---|---|
| Paralysis of motion, left side, with muscular atrophy and loss of temperature; sensibility good; dilated pupils; joint pain left side; coma | Girth 31 inches<br>Weight 90 lbs.<br>Cicatrix on penis | Calvarium strongly thickened over two-thirds of its extent; on left side inner surface commencing hæmatoma size of a florin, same on corresponding surface of dura mater: dura mater strongly adherent to brain along longitudinal sinus and at spots to arachnoid; left hemisphere vascular; commissural parts diffluent; on right side between central ganglia a softened looking spot, probably remains of an apoplectic clot (by microscope acicular crystals, rhomboid plates, granular amorphous debris); serum at base of brain and over medulla and pons; vessels degenerated<br>Brain 3 lbs. 1 oz. | Lower and posterior part of left lung gangrenous |
| Left hemiplegia; severe pain right side of head; gastric disturbance, succeeded by convulsive fits limited to left side, and coma; coma gradual but intermitting; stertor; death | Squamous coppery eruption on body | Dura mater very vascular; pia mater injected; sinuses engorged; an abscess with 2 oz. of greenish pus in anterior lobe of right cerebrum; the wall, a thick tough membrane; substance of right hemisphere soft and easily broken down; the same of left cerebral lobe | .. .. |
| Constant severe pain in right side of head, face, and ear (cephalalgia and neuralgia admissions) 18 months formerly; right facial paralysis extending to extremities; coma. Articulation very imperfect | .. .. | Texture of brain soft; in optic thalami a softened cavity; on left side, size of a walnut, with very soft surrounding tissue; on right side producing total destruction. Three gummatous nodules are present in pons: one, size of hazel nut, near to junction of pons and crura cerebri, firm gummy consistence with soft tissue surrounding; one hard and yellow on right side, near origin of glosso-pharyngeal nerve; one small, with softening near it. Deposit of lymph in connection with nerves of fourth ventricle. Spinal cord soft near its junction with medulla, also pulpy degeneration and softening in dorsal region, involving white substance | Lungs collapsed, no deposits |

| No. of Case—*contd.* | Heart and Vascular System. | Peritoneal Cavity. | Alimentary Canal. |
|---|---|---|---|
| 5 | 7½ oz. Flabby, fat on surface; fluid blood in cavities; dimensions normal | .. .. | Intestines extremely transparent and atrophic; small lymphatic vessels could be seen in gut; amyloid generally, but not so marked in duodenum; fœcal accumulation |
| 6 | 8 oz. Large and flabby | .. .. | .. .. .. |
| 7 | Much adipose tissue on heart's surface, apex formed by it; white patch on right ventricle, the walls of which are very thin; left contracted. Weight 8 oz.; substance fatty | .. .. | .. .. .. |

| Liver. | Spleen. | Kidneys. | Bladder and Generative Organs. | Joints, Bones and Muscles. |
|---|---|---|---|---|
| 3 lbs. Tawny colour; acini distinct. On convex surface, right lobe, a discoloured depression corresponding to a firm yellowish growth, size of a marble. Organ cuts tough | White spot anteriorly, somewhat pigmented | 12 oz. Tubules granular under the microscope | | |
| Peritoneal thickening over liver; substance dark, contracted 3lbs. 3 oz. | 4½ oz. Small, soft | 13 oz. Congested | | |
| 4 lbs. Left lobe twice usual size; stellate cicatricial puckerings on both surfaces, varying from 2 in. to ½ in. in length, and indicating loss of substance. No present deposits; parenchyma friable | 17 oz. Pigmented | 12 oz. Normal | | |

| No. of Case. | Age. | Years of Service. | Details of Service in sequence. | Previous History of Disease in sequence. | Where Primary Lesion contracted. | Duration of Lesion. | Duration of last Hospital Admission. |
|---|---|---|---|---|---|---|---|
| 8 | 36 | 17 | .. .. | Rheumatism<br>Dysentery<br>Remittent Fever<br>Primary Syphilis<br>Dysentery<br>Cephalalgia (3 times)<br>Paralysis | Portsmouth. | Paralysis<br>13 months<br>3 days | 4 months<br>3 days |
| 9 | 30 | 6 | Home .. 2<br>India .. 4 | Syphilis, Primary and Secondary<br>Otitis, Cephalæa<br>Paralysis | India | Paralysis<br>2 years<br>3 months | 2 months<br>25 days |

| Predominant Symptoms characterizing last Illness. | External appearance. | Cranium, Spinal Canal, and Contents. | Neck, Chest, and Respiratory Organs. |
|---|---|---|---|
| Right hemiplegia; contraction of muscles of the affected side; loss of speech; loss of deglutition; epileptic fits | Girth 32 inches<br>Weight 110 lbs.<br>Rigid contraction of muscles of right side, with flexion of right leg | Dura mater adherent along sinus and over cerebellum; opacity and hyperæmia of arachnoid; spaces between convolutions filled with gelatinous fluid; pia mater congested; external surface of brain generally firm; convolutions of right side turgid and flattened; of left atrophy of portions from the fissure of Silvius backwards; on outer surface of middle lobe left hemisphere are two depressions of convolutions, five lines below general level, small and atrophied, colour light yellow with softening and brittleness of vessels. Anterior to fissure of Silvius, and ½ in. from left frontal convolutions, in white substance, are three irregular cavities closely grouped, largest five lines diameter, containing clear fluid, and surrounded by indurated tissue. Immediately beneath, and in relation with, the central ganglia, on right side, is a large nodular deposit 1 in. × 9 lines, firm, indurated, with soft brain tissue surrounding; nodule consists of fibrillated material, spindle-shaped cells very minute, and much granular matter | Congestion of mucous membrane over cricoid cartilage extending to bifurcation where a lymphy exudation is present; left pleura contains 20 oz. red serum, with recent lymph; left apex consolidated; red hepatization of substance, with solitary centres of inflammation disclosing pus. Right texture soft, crepitant; large nodular patches of apoplexy |
| Cachexia and rupia; paralysis right side; coma | Rupial ulceration over body | Hyperostosis and considerable roughness of inner calvarium; thickening of the membranes and adhesion of dura mater to arachnoid by tough yellow fibrous-like tissue; opacity of arachnoid; excess of sub-arachnoid fluid; brain substance very pale and soft; ventricles with much turbid fluid; convolutions present the appearance of gummatous tumours on sections. Brain, 2 lbs. 14 oz. | Old pleural adhesions right base; two large gummatous tumours, one in middle and one in lower lobe, right lung; tissue consolidated around; none in left |

| No. of Case—*contd.* | Heart and Vascular System. | Peritoneal Cavity. | Alimentary Canal. |
|---|---|---|---|
| 8 | White spot on right ventricle, some opacity and thickening of septal lappet of mitral valve; corrugation with yellow discoloration and atheroma of aorta; left ventricle hypertrophied<br>Weight 9 oz.<br>Orifices: right, 1·67 and 1·18 in. diameter<br>left, 1·18 and 1·03 | .. .. | Irregular atrophy of small intestines; catarrhal congestion, with lymphy effusion in ileum: wasting of substance of colon, with some contraction of gut towards rectum |
| 9 | Fatty deposit on surface; 7¾ oz. in weight; roughness of inner surface of ascending aorta | .. .. | .. .. |

| Liver. | Spleen. | Kidneys. | Bladder and Generative Organs. | Joints, Bones and Muscles. |
|---|---|---|---|---|
| 2 lbs. 11 oz. Substance dark brown, from interlobular congestion; texture somewhat fatty | 8 oz. Surface marked by brownish yellow spots, with floculi of lymph adhering | 13 oz. Embedded in fat; substance congested, with swelling of cortical portions | | |
| 4 lbs. 5 oz. | 9 oz. | Each 7 oz. | | |

| No. of Case. | Age. | Years of Service. | Details of Service in sequence. | Previous History of Disease in sequence. | Where Primary Lesion contracted. | Duration of Lesion. | Duration of last Hospital Admission. |
|---|---|---|---|---|---|---|---|
| 10 | $27\frac{8}{12}$ | 10 | Home ..<br>Cape .. | Syphilis<br>Epileptiform Fits<br>Intermitting Paralysis | Cape | 8 years | 2 months<br>14 days |

| Predominant Symptoms characterizing last Illness. | External appearance. | Cranium, Spinal Canal, and Contents. | Neck, Chest, and Respiratory Organs. |
|---|---|---|---|
| Tongue slightly drawn to right; tremor in walking; dragging of right leg; no loss of sensation; defective intellect. Convulsive fits; defects of vision; semi-coma; hemiplegia complete; recovery; severe pain in left side of head; relapse; death | Ulceration of penis and skin | Calvarium extensively diseased; frontal bones on inner surface rough, excavated, some nearly involving whole thickness of bone; the depressions oval with elevated surrounding margins; inner surface of parietal and occipital bones rough, porous, and the middle fossa bones extensively absorbed. Dura mater adherent along superior longitudinal sinus, and over the anterior lobe of left hemisphere it is thickened and adherent to gummatous tumours. Brain texture softened; convolutions flattened. The whole of the anterior lobe, left side, except a small portion in the under and outer surface, has softened, leaving an excavation 3·6 × 2·5 × 1·6 inch; cerebral mass forming the boundaries diffluent. Anterior; and to the outer side of this, is a large, firm, gummatous tumour, size of a walnut, and on its inner aspect is a second, firm, yellow colour, 1·6 × 1·4 inch, extending 1·3 inch into brain substance. These deposits are superficially situated. The dura mater covering them is thickened and cribriform; the growths appear older nearer the dura mater, and, extending into the brain, producing softening around them. Left central ganglia almost diffluent; 1½ oz. of serum in ventricles. No deposit in right side, but texture somewhat softened | Lungs gorged with blood; crepitant; free from deposit |

| No. of Case—*contd.* | Heart and Vascular System. | Peritoneal Cavity. | Alimentary Canal. |
|---|---|---|---|
| *10* | Much adipose tissue externally. Weight, 9 oz. | Large amount of fat in abdominal walls | .. .. |

| Liver. | Spleen. | Kidneys. | Bladder and Generative Organs. | Joints, Bones and Muscles. |
|---|---|---|---|---|
| 4 lbs. 1 oz. On convex surface, many cicatrices with depressions, from which fibrous bands radiate into substance, with many deposits still remaining in tissue of organ; the majority are yellow, undergoing fatty metamorphosis and absorption | 10 oz.; pigmented | 13 oz. | | |

| No. of Case. | Age. | Years of Service. | Details of Service in sequence. | Previous History of Disease in sequence. | Where Primary Lesion contracted. | Duration of Lesion. | Duration of last Hospital Admission. |
|---|---|---|---|---|---|---|---|
| 11 | 29 | $7\frac{9}{12}$ | Home .. $1\frac{5}{12}$<br>India .. $6\frac{4}{12}$ | Dysentery<br>Malarial Fever<br>Syphilis, Primary<br>Syphilis, Secondary<br>Aortic Disease<br>Paralysis from Embolism | ? | ? | 23 days |

| Predominant Symptoms characterizing last Illness. | External appearance. | Cranium, Spinal, Canal, and Contents. | Neck, Chest, and Respiratory Organs. |
|---|---|---|---|
| Intellect gone; helpless; muscles of arms wasted and rigidly contracted; lower extremities not affected; right side colder than left; no diminution of sensibility; left pupil more dilated than right; urine and fæces passed involuntarily; coma and stertor | Weight 102 lbs. Girth 32¼ inches Cicatrix on penis | Irregular thickening of calvarium; porosity of inner table, especially over frontal prominences; dura mater adherent to brain, especially along superior longitudinal sinus; opacity and subarachnoid effusion over posterior aspect of cerebellum; thickening and adhesion of arachnoid where reflected from cerebrum to cerebellum; intense congestion of pia mater over surface, especially on right side; anterior lobes soft, especially corresponding to frontal eminences; loss of substance of convolutions (more on left), flattened anteriorly and superiorly, sulci obliterated (more on left); effusion of blood around optic bulb, right side; left free; some fluid in cerebro-spinal cavity; coagulum in right carotid artery as it rises from sella turcica, and also in left vertebral as it passes to form basilar; brain texture pulpy and soft; fluid in left ventricle, and neighbouring tissue almost diffluent; great destruction in corpora striata; yellow deposits in middle of cerebral ganglia; left corpus striatum yellow with great surface loss; the convolutions, anteriorly, on left side, corresponding to pulpy surface, exceedingly soft and diffluent, and immediately beneath there is a soft yellowish dirty deposit the size of a nutmeg; cerebellum normal | Evidence of previous ulceration on inner aspect of epiglottis; pleuræ slightly adherent; right bronchi intensely injected; right lung congested with pulpy softening; left also congested and adherent to aorta |

| No. of Case—*contd.* | Heart and Vascular System. | Peritoneal Cavity. | Alimentary Canal. |
|---|---|---|---|
| *11* | Pericardium and heart loaded with fat, serum in cavity; texture of heart firm; decolorized coagulum in right side, dark coloured in left; left ventricle and chordæ tendiniæ hypertrophied; aorta sacculated with intense corrugation of lining membrane, and small masses of fibrine adherent to surface. About 3 in. from valves is a deep excavated ulcer, size of bean, filled with fibrinous coagula; also loss of substance in parts elsewhere; aortic valves somewhat thickened<br>Measurements, 4·8 × 3·6 × 3·6 × 10 in. circumference<br>Orifices: right 1·45 and 1·18 in. diameter<br>left ·92 and 1·03 | .. .. | Loss of substance of tonsils, exposing crypts |

| Liver. | Spleen. | Kidneys. | Bladder and Generative Organs. | Joints, Bones and Muscles. |
|---|---|---|---|---|
| 2 lbs. 10¾ oz. Adherent to diaphragm; slight superficial cicatrices and loss of substance; numerous small white spots interspersed in tissue (intense proliferation of round and oat-shapen cells); very firm | 6½ oz. Soft; similar white deposits in substance | Granular degeneration; contraction and loss of substance at periphery; intense congestion and fat deposit about the pelvis; capsule old, thickened, and opaque | | |

| No. of Case. | Age. | Years of Service. | Details of Service in sequence. | Previous History of Disease in sequence. | Where Primary Lesion contracted. | Duration of Lesion. | Duration of last Hospital Admission |
|---|---|---|---|---|---|---|---|
| 12 | 35 | 15 | Home ..<br>Ceylon ..<br>Bengal .. | Remittent and Intermittent Fever<br>Syphilis, Primary<br>„ Secondary (very severe)<br>Paralysis | India | ? | 11 days |
| 13 | 27 | $5\frac{9}{12}$ | Home .. $1\frac{6}{12}$<br>India .. 3<br>China .. 1 | Syphilis, Primary<br>„ Secondary (rupia, nodes, iritis, paralysis) | China | Paralysis about 1 year | 67 days |

| Predominant Symptoms characterizing last Illness. | External appearance. | Cranium, Spinal Canal, and Contents. | Neck, Chest, and Respiratory Organs. |
|---|---|---|---|
| Syphilitic cachexia; paralysis of motion of right side; no loss of sensation; return of movement of arm before death; intense headache | Weight 100 lbs. Subcutaneous deposit of yellow, tough, greasy fat | Calvarium thickened; circular depressions, size of split pea, over supra-orbital, occipital, and parietal regions; necrosed portions with caries at some of these spots; dura mater thickened, with opacity along course of meningeal vessels; opacity of arachnoid over pons, and generally at base; pia mater much congested. Brain, 41½ oz.; in optic thalami a yellowish substance (not yet softened), on section irregularly infiltrated among these ganglia, but more so on right side | Bronchi filled with frothy fluid; tough mucus adherent to trachea. Right lung emphysematous throughout. Infiltration of globular nodular substances of whitish-yellow elastic material in lower lobe of left lung; near the surface at one spot it shows through the pleura, and seems to fill the air cells; is surrounded by considerable vascularity and softened pulmonary tissue |
| Pains in head; loss of speech; drowsiness; hyperæsthæsia of lower limbs; paralysis of motion and sensation, right side; pupils dilated; complete insensibility; paralysed leg abducted and rigid before death (embolism of left middle cerebral artery) | Weight 93 lbs. Girth, 33 inches; induration of cicatrices on penis; coppery eruption on body | Inner surface of scalp coated with a thick film of yellow, semi-transparent exudation: cranial bones porous externally; canals wider, and penetrated by this exudation; calvarium uniformly thickened and dense, diploë gone, ivory-like and eburnated. Dura mater thickened and vascular; osteo-phyttic layers, grooved and moulded to blood vessels, coat its inner surface; arachnoid thick and opaque; extreme hyperæmia of pia mater. Brain, 3 lbs. 3¾ oz.; convolutions flattened; hemispheres irregular; upper aspect of both frontal lobes depressed, in proportion to dimished capacity of cavity from osteo-phyttic lamination; convex surface of left hemisphere less firm — its middle cerebral artery contains a firm, dense, yellow thrombus, not filling it up completely; white softening of medullary portion of left hemisphere, increasing from periphery inwards, and in excess at central ganglia; ventricular capacity reduced, from outward pressure; right side normal | Right lung red hepatized posteriorly in the middle and upper lobes; not pervious to air. Left collapsed; normal |

| No. of Case—*contd.* | Heart and Vascular System. | Peritoneal Cavity. | Alimentary Canal. |
|---|---|---|---|
| *12* | Deposit of yellow tough fat on anterior aspect of ventricles; ventricular valves opaque | .. .. | Deep longitudinal ulceration at base of tongue; marks of deep glistening cicatrices, and great hypertrophy of papillæ - like condylomata; no uvula, but cicatrix occupies the site. Great thickening of mucous membrane of stomach; miliary deposit abundant at lower part of jejunum and above the ileo-cæcal valve, also throughout the duodenum immediately below the pylorus |
| *13* | Serum in pericardiac cavity. Right auricle contains partially decolorized clot; left, dark grumous blood; thickening of lappet of mitral valve next the septum, with remains of adherent coagulum. Coagulum in pulmonary artery | .. .. | Cicatrix of left tonsil, abscess in right. Villi degenerated and intestines generally atrophied; Peyer's glands atrophied, except in upper patch, where there is deposit and ulceration; intense vascularity of cæcum |

| Liver. | Spleen. | Kidneys. | Bladder and Generative Organs. | Joints, Bones and Muscles. |
|---|---|---|---|---|
| 58 oz. Tissue firm and congested generally marking out lobules; yellowish white substance, not softened, infiltrated throughout several portions, from the periphery inwards; loss of substance to a considerable extent, obvious by cicatrix-like marks on the surface; isolated lobules seem to have disappeared. Four separate masses, globular, existed at irregular intervals in the substance of the lobes; softening had commenced in the centre of one, and a considerable amount of white condensed tissue surrounded them; substance in the vicinity of these masses considerably altered by congestion, and dark pigment deposits size of split pea | 5 oz. | Left, 5½ oz. Right, 5¼ oz. | | Temporal bones on both sides are rough internally, and a white deposit shows through on the left side |
| 3 lbs. 3½ oz. Lobules small, but separated by distinct white tissue; substance soft, with evidence of degeneration of acini | 2 oz. Substance interspersed with yellow, soft deposit, small in size; soft and pulpy | 9½ oz. Capsule adherent; cortex increased and swollen | | |

| No. of Case. | Age. | Years of Service. | Details of Service in sequence. | Previous History of Disease in sequence. | Where Primary Lesion contracted. | Duration of Lesion. | Duration of last Hospital Admission. |
|---|---|---|---|---|---|---|---|
| 14 | 25 | $7\frac{5}{12}$ | Home .. 2<br>India .. $5\frac{5}{12}$ | Malarial and continued fevers<br>Syphilis, Primary<br>Syphilis, Consecutive | India | 5 years | 6 days |
| 15 | 33 | 13 | India .. 13 | Rheumatism, Acute<br>Fever, Malarial<br>Dysenteria<br>Phthisis Pulmonalis<br>(Primary Syphilis, when?) | .. .. | ? | ? |
| 16 | 29 | 4 | Home | Lesion of deep tissues of eye<br>Ulceration of pharynx and tonsil<br>Cachexia and rheumatism<br>Pneumonia; phthisis | Home | Over 2 years | ? |

| Predominant Symptoms characterizing last Illness. | External appearance. | Cranium, Spinal Canal, and Contents. | Neck, Chest, and Respiratory Organs. |
|---|---|---|---|
| Extreme emaciation and cachexia; consolidation of lung apices; exhaustion | Girth 28 inches. Weight 116 lbs. Cicatrices; rupial spots; tibial nodes | Slight porosity of calvarium; vascularity of surface of right hemisphere; considerable fluid in ventricles. Brain, 2 lbs. 14½ oz. | Remains of ulceration at posterior part of larynx; bronchi loaded with frothy mucus; glands at root of lungs extremely pigmented; lungs congested; near anterior margin, upper lobe of right, a firm fibrinous nodule, 2 in. diameter; others, smaller, scattered throughout lung and pigmented; small cavities about middle of free border; left, with diffused miliary tubercle and firm solid nodules at intervals; anterior border emphysematous. 2 lbs. 7½ oz. |
| Cavities in lungs; liver enlargement; syphilitic cachexia | Girth of chest 28½ inches Weight 88 lbs. Deep cicatrix on penis | Irregular thickening of calvarium, especially frontal; cicatricial loss of substance of external tables and diploë on each side of frontal bone, more advanced in left; irregularly congested spots throughout calvarium; slight amyloid reaction in vicinity of cicatrices; small nodular swellings on right parietal bone, near centre; softening of brain tissue, especially commissural. Brain 3 lbs. 2 oz. | Yellow deposit in mucous membrane of trachea; lungs, both consolidated with also œdema of tissue; deposit of material, semi-cartilagineous in appearance, towards posterior and lower parts of both, with dark red tissue surrounding; a large cavity in left apex and smaller ones forming, with yellow exudation around |
| .. .. | Syphilitic maculæ on legs, arms, and back | Intense congestion of pia mater | Great enlargement of cervical and thoracic glands; bronchial mucous membrane very vascular; healed ulcer at commencement of right bronchus; adhesions of left pleura and fluid effusion. Left lung, only one-third lower lobe crepitant, the rest consolidated; the same on right side; small cavities in left, the size of pea, with cretaceous deposits and cicatrices and puckerings on pleural surface; cavity in right lung, size of walnut, cicatrizing |

| No. of Case—*contd.* | Heart and Vascular System. | Peritoneal Cavity. | Alimentary Canal. |
|---|---|---|---|
| *14* | Small white spot on right ventricle; decolorized coagulum in left ventricle extending into aorta, which has commencing atheroma in lining membrane. Weight 7 oz. | .. .. | Loss of substance of tip of tongue; papillæ at base very large. Intestines thin and wasted; Peyer's glands atrophied; small aggregate yellow growths spread over the inner surface of jejunum; a few small solitary ulcers at intervals in gut; intensely amyloid |
| *15* | Decolorized coagulum in aorta; cicatricial loss of substance at its curve, which is adherent to right pleura posteriorly; deposits of atheroma from sinus valsalva throughout arch | .. .. | Loss of substance of tonsils; papillæ of tongue greatly enlarged. Intense pigmentation in sub-mucous membrane of stomach, with slight reaction of iodine in vessels; villi of intestines atrophied, intensely amyloid; great softening of tissues of duodenum, chiefly in connection with Bruner's glands; solitary glands generally ulcerated; chronic ulceration in colon, most marked towards cæcum; cicatrices in rectum |
| *16* | White spot on heart; fluid in pericardium; substance of heart soft; steatoma and contractions in thoracic portion of aorta<br>Measurements—vertical 5·2 in.; ventricles 4·2; transverse 4<br>Diameter of orifices—tricuspid 1·45; mitral 1·45.; pulmonary 1·32; aorta 1·03 | .. .. | Substance of intestines wasted; portions of villi amyloid |

| Liver. | Spleen. | Kidneys. | Bladder and Generative Organs. | Joints, Bones and Muscles. |
|---|---|---|---|---|
| 4 lbs. 5 oz. Thickening of capsule, most marked at points; in centre of left lobe a yellow softening nodule, size of plum; substance of liver dense, firm, amyloid; increase of connective tissue | 7½ oz. Adherent to diaphragm, where capsule is dense, white, and semi-cartilaginous; substance chocolate, glomeruli obvious; strong iodine reaction | 11½ oz. Left, tough; irregularity of surface from loss of substance of cortex; stellate congestion; amyloid reaction; right in same condition. By microscope the connective tissue is increased; the tubes are contracted at points, and varicose | .. .. | Under surface of of sternum there is a node; first portion of sternum thickened |
| 7 lbs. 11½ oz. Measurements 10·5 in. × 8·4 × 4·3; cicatricial loss of substance; intense pigmentation in parts; acini very enlarged, and amyloid throughout. By microscope there is a large number of intra-lobular fatty deposits, with many crystals; a great increase of the connective tissue near loss of substance, and intense amyloid state of cells | 15¼ oz. Tolerably firm; glomeruli and pigment very obvious; amyloid intense | Cortical substance swollen and flabby, with encroachment and displacement of pyramidal portion | .. .. | Considerable thickening of sternum near ensiform cartilage, and also the cartilages of the lower ribs |
| | | Commencing amyloid degeneration in malphighian corpuscles; white specks apparent here and there on removal of capsule | Yellow deposit in each testicle at commencement of epididymis. The tubes of gland will not unravel, but are bound together by dense connective tissue | |

| No. of Case. | Age. | Years of Service. | Details of Service in sequence. | Previous History of Disease in sequence. | Where Primary Lesion contracted. | Duration of Lesion. | Duration of last Hospital Admission. |
|---|---|---|---|---|---|---|---|
| 17 | $26\frac{8}{12}$ | 8 | Home .. 6<br>India .. 2 | Syphilis<br>Periosteal and periarticular rheumatism<br>Caries of metatarsal bone of great toe<br>Caries of right wrist and thumb<br>Phthisis | Bombay | $2\frac{8}{12}$ years | 8 months 21 days |
| 18 | 39 | $17\frac{11}{12}$ | Prior service ?<br>Home .. 2<br>Canada .. 2 | Syphilis, Primary<br>Sudden loss (temporary) of motion of lower extremities, twice<br>Phthisis<br>Aortic Aneurism | .. .. | Aneurism $1\frac{2}{12}$ years | 19 days |
| 19 | 31 | 7 | Home .. $3\frac{10}{12}$<br>Canada .. $3\frac{2}{12}$ | Syphilis, Primary<br>Syphilis, Secondary<br>Morbus Val. Cordis (deg. of vessel and valves) | Home | Syphilis 5 years. 222 days Heart Disease | 27 days |

| Predominant Symptoms characterizing last Illness. | External appearance. | Cranium, Spinal Canal, and Contents. | Neck, Chest, and Respiratory Organs. |
|---|---|---|---|
| Removal of right hand; inflammation of right knee; advance of phthisis; diarhœa; exhaustion | Emaciation; stump cicatrized; ulcer on dorsum of foot partially healed | Absorptive process on the inner table of calvarium centrally and laterally, giving a minutely porous appearance, with vascularity; yellow discoloration of dura mater; arachnoid opaque; pia mater very vascular generally, especially anteriorly, with posterior veins turgid; sinuses ℥ loaded at base<br>Brain 3 lbs. 2 oz. | Lungs bound to chest-wall by dense adhesions; bronchial glands enlarged; left lung infiltrated with tubercle in isolated granular masses; large cavity at apex |
| Extreme dyspnœa; systolic bruit; sudden pain in region of diaphragm; gradual sinking | Girth 32½ inches. Fair nutrition; cicatrices on penis; nodes on legs | Pericranium strongly adherent; porosity of calvarium; yellow discoloration and cicatricial loss of substance in calvarium; dura mater thickened. Brain 2 lbs. 14¾ oz. | Large coagulum in right pleura (clot 2 lbs. 8 oz., serum 12 oz.) between base of lung and diaphragm; old adhesions, left side; right lung condensed from absence of air; two nodular growths in apex; left has two cretaceous masses in apex. Weight of lungs 3 lb. 7¼ oz. Aneurismal sac pressing on base of left lung; blood extravasation along tissues between esophagus and root of lungs |
| Angina pectoris; œdema, dyspnœa, hæmoptysis | Girth 40 inches<br>182 lbs. weight<br>Cicatrix and induration on penis | Small bony growths on inner surface of calvarium; circular growths of bone on inner surface of dura mater, and spiculæ along longitudinal sinus; membranes congested. Brain 3 lbs. 4 oz. | Bronchial glands very enlarged; mucous membrane of larynx congested; two small symmetrical deposits, one on each side of larynx and immediately above vocal cords; left pleura contains 30 oz. serum; left lung adherent to pericardium; various degrees of apoplexy and pneumonia at base; cicatrices posteriorly; right lung congested, with frothy mucus at apex; base as in left |

| No. of Case—*contd.* | Heart and Vascular System. | Peritoneal Cavity. | Alimentary Canal. |
|---|---|---|---|
| *17* | Heart pushed down by enlarged bronchial glands; muscular substance flabby; walls of right auricle very thin, flabby, with dark clots in interior; ventricles occupied by dark clot | Enlargement of glands near head of colon and irregular dilatation of great gut; distension of cæcum and regular contraction of descending colon | Mucous membrane of small intestines congested in patches; villi amyloid in parts; extensive ulceration of Peyer's patches with solitary glands of jejunum enlarged and turgid; crypts of Leiberkuhn more or less wasted; ileo-cæcal valve ulcerated; colon intensely congested with ulceration, chiefly circular, and probably commencing in solitary glands. |
| *18* | 3½ oz. serum in pericardum; apex below margin of sixth rib, with left edge 2 inches beyond junction of the cartilages and ribs; left ventricle dilated and hypertrophied, forming apex. Weight 1 lb. 3½ oz.; measurements 5·6 × 4·7 × 4·2 × 12·2 circumference. Orifices: right 1·67 and 1·32; conus art. 1·45; left 1·54 and 1·18. Aorta considerably corrugated and dilated in the ascending portion; circular patches of degeneration here and there in descending portion, where aneurism-sac 3½ × 3 in.: an almost solid fibrous mass, with an old opening into a second diffused sac | Convex margin of stomach, within 2 inches of symphysis pubis, transverse colon intervening; blood between peritoneum and stomach from esophageal end to about 2 inches over anterior surface; also between cruræ of diaphragm into lumbar region; none in peritoneal cavity | Enlargement and loss of substance in tonsils |
| *19* | Pericardium thick and vascular; apex of heart 2½ inches behind the cartilage articulation of fifth rib; right edge of heart at articulation of cartilages and ribs; pericardial space 6½ in. broad × 3½ in.; right side and vena cava engorged; aorta atheromatous, with valves thick and incompetent. Weight 1 lb. 4¾ oz. Dimensions 6·9 × 4·4 × 5· × 14·7 circumference. Orifices, diameter: right 1·83 and 1·18; left 1·45 and 1·03 | .. .. | Papillæ at base of tongue very much enlarged; cicatrices on tonsils; mucous membrane of pharynx cyanosed; mucous membrane of stomach engorged and mamillated |

| Liver. | Spleen. | Kidneys. | Bladder and Generative Organs. | Joints, Bones and Muscles. |
|---|---|---|---|---|
| 6½ lbs. Transverse 11 in.; antero-post 9 in.; vertical 3⅜ in. Right lobe extends to within 2 in. of iliac crest, impressed by ribs; lobules infiltrated with yellow biliary matter and fatty degenerated; each lobule defined by a clear refracting substance intensely amyloid; vena porta turgid | 9¼ oz. | Irregular in shape; 18 oz.; marked stellate congestion on surface in patches half-inch square, corresponding to irregular depressions, associated with considerable loss of kidney substance; small cysts, size of pea, filled with yellow soft material in cortical substance, which is otherwise pale and bloodless; tubes loaded with fat globules and clear casts; glomeruli shrivelled, and give with iodine a slight reaction in a few points | | Circumference of left knee 13$\frac{7}{10}$ in.; right 15$\frac{6}{10}$ in.; enlargement due to inner condyle and head of tibia; right coracoid process enlarged |
| 3 lbs. 5¼ oz. Blood coagulum on upper margin; tissue soft; intralobular congestion; paleness of margins of acini | 7 oz. Soft; much pigment; glomeruli very obvious | 14½ oz. Firm; capsule adherent; considerable loss of substance on surface of left; cortex highly congested; portions condensed as if from fibrous impaction of renal arteries (embolic?) | Small white irregular deposits in left testicle, with a surrounding ring of pale, condensed tissue; right normal, but hardness and induration of epididymis | Fatty degeneration of diaphragm; vertebræ corresponding to aneurism eroded, with projection of intervertebral substance |
| 3 lbs. 6½ oz. Cirrhotic on surface; nutmeg; cicatricial contraction on surface from loss of substance | 7¼ oz. | 1 lb. Left, hard and firm; capsule adherent; distinct cicatricial loss of substance; cortical portion relatively increased; the right in same condition | | |

| No. of Case. | Age. | Years of Service. | Details of Service in sequence. | Previous History of Disease in sequence. | Where Primary Lesion contracted. | Duration of Lesion. | Duration of last Hospital Admission. |
|---|---|---|---|---|---|---|---|
| 20 | $26\frac{6}{12}$ | $6\frac{6}{12}$ | Home .. 4<br>Canada .. 1<br>Home .. $1\frac{6}{12}$ | Gastritis<br>Syphilis and Venereal Lesions (often)<br>Ophthalmia<br>Morbus Val. Cordis<br>Aortic Degeneration | .. .. | Heart Disease 506 days | 1 month 25 days |
| 21 | 35 | 8 | Home .. 4<br>India .. 4 | Primary and Secondary Syphilis<br>Acute Dysentery<br>Morbus Val. Aortis et Mitral (aortic degeneration)<br>Scorbutus | India | Valve Lesion 2 years | 41 days |
| 22 | 24 | ? | Home ..<br>Malta .. | Syphilis prior to enlistment<br>Mediterranean Fever<br>Epistaxis, Hæmatemesis, and Hæmoptysis<br>Purpura and Liver enlargement | ? | ? | 71 days |
| 23 | 36 | 17 | Home ?<br>India ? | Primary Syphilis<br>Rheumatism, Acute<br>Remittent Fever<br>Hepatic enlargement | Calcutta | ? | ? |

| Predominant Symptoms characterizing last Illness. | External appearance. | Cranium, Spinal Canal, and Contents. | Neck, Chest, and Respiratory Organs. |
|---|---|---|---|
| Syphilitic cachexia; hæmoptysis; asthenia; mitral bruit; œdema | .. .. | .. .. | Lungs congested; parenchyma normal |
| Chronic dysentery; scurvy; systolic bruit; pneumonia; semi-coma; death | Girth 32 inches Weight 93 lbs. | Brain substance anæmic; firm, straw-coloured serum in ventricles; gritty degeneration of pineal gland. Brain 3 lb. 3 oz. | Cyanotic congestion of esophagus and pharynx; trachea congested; base of right pleura adherent; 4 pints of clear serum in cavities; purulent fluid in small bronchi; both lungs consolidated posteriorly; extensive melanotic deposit in lungs and lymphatics at roots; capillary engorgement of smaller bronchi; texture œdematous. Weight 4lbs. 4 oz. Air cells loaded with cell formations of various sizes, blood corpuscles, and exudation cells; the black melanotic degeneration affecting chiefly the ramifications of the smaller air tubes |
| Emaciation; purpura; symptoms of phthisis; cachexia, and liver enlargement | .. .. .. | Dura mater rough externally, with pigmented discolorations along track of sinuses; pia mater congested; subarachnoid effusion; bloody serum in ventricles | Mucous membrane of trachea towards bifurcation very vascular; thyroid gland, 2½ oz. Thoracic glands at root of lungs very large. Right pleura contains 42 oz. of clear serum; pleura and diaphragm covered by soft lymph; several isolated, circumscribed, nodular growths in lungs, size of bean, not recent, composed of minute cell-forms of connective tissue (syphilitic nodes). Lungs, 2 lbs. 3 oz. |
| .. .. | Girth 33 inches Weight 100 lbs. | Frontal bones ulcerated on surface with gummatous deposits in different parts, some not yet ulcerated, but in one place penetrating the skull; considerable thickening of calvarium; yellow fibrinous coagulum in sinus. Brain pale and anæmic; 3 lbs. 1 oz. | Mucous membrane of bronchi red. Towards base of right lung is a circumscribed nodular growth, 2 inches thick, irregularly oval, commencing to soften in centre, and indicated through pleura by discoloration; a less nodule of similar character near it; tissue around softened and vascular. |

| No. of Case—*contd.* | Heart and Vascular System. | Peritoneal Cavity. | Alimentary Canal. |
|---|---|---|---|
| 20 | Heart large and flabby; dark coagulum in cavities; thickening of aortic valves; enlargement of mitral orifice; right ventricle dilated; left hypertrophied; extensive atheroma of aorta, extending into a pouch immediately above valves. Dimensions, 4·5 × 3·5 × 4·2 × 14 in. Orifices: right 1·45 and 1·18; left 1·67 and 1·18 | .. .. | .. .. |
| 21 | Pericardium adherent by vascular lymph—hæmorrhagic pericarditis, with blood effusions, especially at apex, which is formed by the enlarged left ventricle; auriculo-ventricular groove obliterated by lymph; extensive ulceration and cicatrization of anterior lappet of aortic valve, the others leathery and opaque; lappets of mitral opaque; opacity of left endocardial membrane; extensive degeneration of aorta throughout thorax; nodular formations, with cicatricial puckerings. Dimensions, 6·6 × 5·2 × 4·8 × 13. Weight 1 lb. 9 oz. Orifices: right 2· and 1·18; conus art. 1·83; left 1·67 and 1·18 | .. .. | Hæmorrhagic patches in mucous membrane of stomach; great vascularity in some portions of mucous membrane; small intestines with gelatinous lymph exudations; ulceration and pigmented degeneration in Peyer's glands; throughout larger intestines extensive shreddy and dysenteric ulceration, contracting, with tendency to heal; cicatrices of healed ulcers in sigmoid flexure; great thickening of gut tissue, with pigmentary degeneration |
| 22 | Pericardium contains 2 oz. of serum; surface covered by hæmorrhagic spots and patches; blood not coagulated in cavities | Fluid, 38 oz. | Mucous membrane of esophagus cyanotic; glands of tonsils filled with secretion; mucous membrane of stomach mamillated, with hæmorrhagic effusion |
| 23 | Some thickening of mitral valve near septum; considerable loss of substance of lining membrane of aorta from sinus throughout arch | 6 pints of fluid in cavity; enlargement of lymphatic glands in the vicinity of hepatic portion of vena cava | Thinning of mucous membrane of stomach; villi and valvulæ conniventes intensely amyloid; pultaceous softening of mucous membrane of colon and large intestines generally, with intense pigmental degeneration extending into small. |

| Liver. | Spleen. | Kidneys. | Bladder and Generative Organs. | Joints, Bones and Muscles. |
|---|---|---|---|---|
| 3 lbs. 15 oz. Cicatricial loss of substance on surface; interlobular congestion; small structureless deposits pervade the parenchyma, from $\frac{1}{200}$ to $\frac{1}{60}$ in., and situated at the periphery of lobules in connection with increased connective tissue | 13 oz. Congested; cicatricial markings from loss of substance | 17 oz. | | |
| 2 lbs. 7 oz. Small, contracted, adherent to diaphragm; cicatricial loss of substance over surface in connexion with gummatous deposits in parenchyma; texture tough, yellow; fatty degeneration of cells with increase of connective tissue; pigmentary deposit, and evidence of biliary retention | 9 oz. Adherent to diaphragm; hæmorrhagic effusion on surface of capsule; texture soft, pultaceous; glomeruli not visible | 12 oz. Capsule easily separated, revealing lobulation of surface of kidney with some cystic degeneration; congestion at junction of cortical and pyramidal portions | | |
| 4 lbs. 3 oz. 9·8 × 6·8 × 3 inches; extends 4 inches below ensiform cartilage; small prominences on surface, from pin's head to pea (nodes); yellow degeneration of acini, especially surrounding intra-lobular orifices. Gall bladder empty | 1½ lbs. | 14 oz. Surface congested; substance mottled; vascular on section, with great prominence of glomeruli; some pyramidal portions obliterated, white growth being substituted | | |
| 5 lbs. Marked by cicatrices on surface and loss of substance; on section through cicatrices are yellow nodular masses, exactly corresponding with those in lungs; numerous small ones are disseminated throughout structure. Gall bladder largely distended with bile | 9½ oz. Capsule degenerated, texture black; glomeruli obvious; considerable pigmentary degeneration; on section feels rough and very amyloid | Flabby; capsule adherent; loss of substance on surface; yellowness of texture. Swollen condition of convoluted tubes, with displacement of pyramids; glomeruli very amyloid | | |

| No. of Case. | Age. | Years of Service. | Details of Service in sequence. | Previous History of Disease in sequence. | Where Primary Lesion contracted. | Duration of Lesion. | Duration of last Hospital Admission. |
|---|---|---|---|---|---|---|---|
| 24 | 30 | $6\frac{6}{12}$ | Home .. 1<br>India .. $5\frac{6}{12}$ | Syphilis, Primary<br>Tonsillitis<br>Ebriositas<br>Enlargement of Liver | India | Liver Disease 376 days | 39 days |
| 25 | 29 | 10 | .. .. | Syphilis, Primary<br>Rheumatism, Acute<br>Syphilis, Secondary<br>Splenic enlargement<br>Hepatic enlargement | .. .. | .. | .. |
| 26 | 33 | 10 | Home<br>India | Ulcers (Delhi)<br>Hepatic enlargement<br>Ascites<br>Primary Syphilis (when?) | India | ? | ? |

| Predominant Symptoms characterizing last Illness. | External appearance. | Cranium, Spinal Canal, and Contents. | Neck, Chest, and Respiratory Organs. |
|---|---|---|---|
| Hæmatemesis; hepatic pain; œdema; asphyxia | Girth, 33 inches<br>Weight 131 lbs.<br>Cicatrices in groin | Surface vessels of brain congested; œdema of substance; softening in region of ventricles. 2 lbs. 13 oz. | Thyroid and cervical glands enlarged; glands at root of lungs enlarged; congestion of lungs posteriorly; dilatation and enlargement of thoracic duct |
| .. .. | Girth of chest 31·5 in.<br>Weight 93 lbs. | Great thickening of internal tables of frontal eminences; cicatricial loss of substance of external table; a patch of yellow nodular material, ¾-inch in diameter, developed in pericranium, which is easily separable from skull; absorption of external table corresponding to node; membranes adherent to brain, especially on each side of longitudinal sinus; substance of brain generally œdematous, soft, and exhales an ethereal odour | Purpuric extravasation into epiglottis; left pleura obliterated; lungs œdematous, infiltrated with serum, friable at base; free from tubercle. 3 lbs. 4 oz. |
| .. .. | Girth 38 in.<br>Weight 164 lbs.<br>Syphilitic ulcers (cicatrices) around ankle; node on tibia; ulcer over sternum, with vascularity and sponginess of bone beneath | Intense adhesion of scalp to frontal bone, and dura mater to calvarium; pia mater vascular | Viscera adherent to sternum; mucous membrane of trachea and bronchi livid; lungs pushed up by liver, the right to 3rd rib; small cretaceous mass in right apex; general capillary bronchitis of left lung, and friability of texture |

| No. of Case—*contd.* | Heart and Vascular System. | Peritoneal Cavity. | Alimentary Canal. |
|---|---|---|---|
| 24 | 5 oz. fluid in pericardium; white patches of recent lymph at base, not causing adhesions; heart normal; degeneration of thoracic aorta and vascularity of its sheath. Blood from the arteries contain numerous lymph corpuscles $\frac{1}{2000}$ inch in size; nucleus very distinct with acetic acid and nucleolus occasionally visible; no tendency to coagulate | 32 oz. of dark straw-coloured fluid | Tonsillitic loss of substance; stomach congested in patches; great enlargement of lymphatic glands along superior margin and head of pancreas and following course of larger vessels; in bunch-like clusters pressing on, and producing dilatation of vena cava; intestines generally congested. |
| 25 | Considerable deposition of fat; white spot; substance flabby; hæmorrhagic stains in lining membrane of aorta; cicatricial contraction and loss of substance at the bend; yellow deposit in its substance<br>Dimensions—5·5 in. × 4·2 × 3·7<br>Orifices—right 1·67 and 1·32 in.<br>left 1·45 and 1·03 in.<br>Weight 9 oz. | Large quantity of bloody serum (116 oz.) with hæmorrhagic extravasations over its surface; large clot of blood in pelvis adherent to peritoneum and posterior aspect of bladder | Extreme ulceration and loss of substance of tissues surrounding tonsils; large crucial cicatrix at root of tongue, surrounded by active ulceration<br>Stomach minutely ulcerated; one large patch, 3 in. by 2 in., towards pylorus, with great congestion and extravasation of blood; mucous membrane of intestine œdematous, with blood spots here and there; Peyer's patches, pigmental degenerated. |
| 26 | Pericardium distended with straw-coloured serum; apex of heart broad and blunt, chiefly by left ventricle; lining membrane of left side opaque, with thickening of chordæ tendiniæ; decolorized coagula in pulmonary artery; cicatricial contraction of lining membrane of aorta with deposit and degeneration<br>Weight 10¼ oz. | Distended with fluid; much fat in mesentery; mesenteric glands enlarged and vascular | Remains of ulceration of tonsils; enlargement of papillæ of tongue and symmetrical fissured ulceration on both sides<br>Pigmental degeneration of stomach; villi of intestines amyloid |

| Liver. | Spleen. | Kidneys. | Bladder and Generative Organs. | Joints, Bones and Muscles. |
|---|---|---|---|---|
| 4 lbs. 13 oz.; hard and irregular on its surface, cirrhotic, yellowish on section; by microscope, great increase of connective tissue, with fatty deposits, chiefly intralobular | 1 lb. 13 oz.; adhering strongly to peritoneum and diaphragm; substance dense and hard to the feel, marked by white spots on surface; very large amount of colourless corpuscles, same as those in blood, but larger in size | 1 lb. 5 oz; greatly congested. Head of pancreas enlarged and hard | Yellowish deposit in right testicle; left partially atrophied, with dense fibrous bands stretching towards interior | Bones exceedingly soft—very porous generally; compact part of long bones very thin |
| A tumour projects on anterior surface, which is throughout studded with yellow nodules and irregularly marked with cicatricial loss of substance; cuts tough and of an intense yellow colour; atrophied; 6 or 8 nodular growths interspersed, some projecting from surface: from these enlargements extensive hæmorrhages have taken place | Adhesion of lower margin of spleen to transverse colon, and of posterior aspect to abdominal walls; enlarged, and has a sacculated aspect | Capsule slightly adherent; cortical substance enlarged, and pyramidal portions displaced; deposit of yellow fat in pelvis | .. .. | Cartilages of right sterno-clavicular articulation soft and ulcerated; inter-articular softened; general pulpy degeneration of joint; thickening of substance of the sternum, and softening of some of the rib cartilages |
| 9 lbs. 14½ oz. Measurements—right lobe, 8·9 × 10·5 × 4·8 in.; left 2·8 × 4·6 × 2 in. Surface irregularly contracted and nodulated by cicatrices; right lobe especially enlarged; lobules very distinct; interlobular pigmental degeneration in some places; on section greasy; intense iodine reaction; biliary ducts distended; no gall stone | 1 lb. 7½ oz. Substance soft, fleshy looking, thickening of trabeculæ along blood-vessels; sacculi visible; intense amyloid | 1 lb. 5½ oz. Large and flabby; cortical substance swollen | | Great brittleness of ribs; extensive congestion of bone tissue and of sternum |

| No. of Case. | Age. | Years of Service. | Details of Service in sequence. | Previous History of Disease in sequence. | Where Primary Lesion contracted. | Duration of Lesion. | Duration of last Hospital Admission. |
|---|---|---|---|---|---|---|---|
| 27 | 32 | 10 | Gibraltar .. 1<br>Crimea .. 1<br>Home .. 8 | Dysentery<br>Primary Syphilis<br>Secondary Syphilis<br>Enlargement of liver and spleen | Home | 8 years | 231 days |
| 28 | 27 | 9 | Home .. 1<br>India .. 8 | Primary and Secondary Syphilis<br>Rheumatism, Acute<br>Orchitis<br>Ebriositas<br>Nephria | India | Syphilis?<br>Nephria<br>276 days | ? |

| Predominant Symptoms characterizing last Illness. | External appearance. | Cranium, Spinal Canal, and Contents. | Neck, Chest, and Respiratory Organs. |
|---|---|---|---|
| Cachexia, hæmatemesis, emaciation; jaundice; unconsciousness; relaxation of sphincters | Surface of body yellow; penis in a state of slough | Inner surface of dura mater congested and yellow, with coloured sub-arachnoid serum; right hemisphere very congested; ventricles with yellow serum; cerebellum soft throughout, especially wall of fourth ventricle, and strands of nerve substance following the visible origin of pneumogastric nerves. Brain 3 lbs. 4 oz. | Thoracic glands at bifurcation enlarged and melanotic; mucous membrane of larynx vascular in vicinity of vocal cords; small white basic ulcers symmetrically situated on epiglottis; pleural cavities contain serum; lungs not collapsing; right, adherent, exudes frothy tenaceous mucus; left attached to diaphragm; at base, posteriorly, a gangrenous spot, size of a cubic inch. Left, 2 lbs. 7 oz.; right, 2 lbs. 5½ oz. |
| Anasarca; diarrhœa; urine all but suppressed. 10·31 sp. gr.; phosphates and albumen very great | Girth 31 inches Weight 126 lbs. Cicatrices on penis | Calvarium dense and thick, porosity of inner surface; small aggregated growths of bone on inner surface of left parietal; cicatricial loss of substance at points in frontal bones; opacity of arachnoid, especially over left hemisphere; substance of brain vascular, but firm and healthy | 52 oz. of dark-coloured serum in pleural cavities; left base adherent to diaphragm |

| No. of Case—*contd.* | Heart and Vascular System. | Peritoneal Cavity. | Alimentary Canal. |
|---|---|---|---|
| 27 | Distinct white patches on pericardium; decolorized coagula in both sides; normal | .. .. | Mamillation of mucous membrane of stomach; congestion of jejunum. Peyer's glands atrophied, obliterated; cæcum congested and thinned |
| 28 | Considerable thickening and irregularity on inner surface of aorta, with wrinkling at points. Heart normal | Several mesenteric glands enlarged, with cheesy deposits—two formed hard, rigid tumours, one underlying the liver, the other in concavity of spleen; a large quantity of fat between, and the tissues around agglutinated | Loss of substance of right tonsil, cicatricial puckering occupying position of left; pharynx and esophagus cyanosed; transverse colon adherent to splenic mass, which was softening, almost perforating the gut. Peyer's glands atrophied and pigmented; dysenteric ulceration in large intestine |

| Liver. | Spleen. | Kidneys. | Bladder and Generative Organs. | Joints, Bones and Muscles. |
|---|---|---|---|---|
| 11 lbs. 5½ oz. Measurements: right lobe 7·1 × 11 × 4½; left 7·7 × 10 × 2⅝. Left overlaps spleen; right extends 6½ inches below ensiform cartilage. Adhesions to peritoneum below 9th rib; surface marked by numerous depressions, size of split-pea; dark livid hue; and at centre of right lobe a deep cicatrix, at base of which is a knot of white growth; substance greasy; acini irregularly enlarged, and in some places excavated by infiltration of small knots of yellow substance; loss of substance along the margins. Iodine reaction very marked. Large ducts obstructed in some places. Lymphatic glands at portal fissure greatly enlarged. Microscope shows obstruction of small ducts and extensive growth of nodes | 14½ oz. Triangular nodular yellow growths in substance same as liver | Right, 7½ oz.; left 9¼ oz. Capsule adherent; substance flabby, with superficial cysts containing clear serum; enlargement of cortical substance; slight reaction with iodine | | |
| Very enlarged; right lobe, 8·6 × 8·5 × 4·5; convex surface tuberculated and nodulated with several cicatricial contractions, one on its concave surface deeply depressed, with fibrous masses passing into substance. Several node deposits in liver tissue, some softening, others firm and hard; ducts distended by inspissated bile; gall stones; mass at portal fissure overlying and enveloping vessels, smaller enlarged lymphatics around. Liver fatty, with minute nodular growths of connective tissue at points | Adherent to diaphragm; investing membrane thick and dense; cicatricial contractions of surface; cheesy deposits in substance. By microscope, the firm, growing granules (equally as in liver, kidneys, and testicles) consist of oat-shapen and round cells in proliferation; the soft masses are fat globules and granules | Enlarged. The left adherent to spleen and pancreas. Cortical substance increased; fatty; atrophy of pyramids; organs enveloped in fat. By microscope, fatty degeneration, cells seldom visible; commencing amyloid degeneration of glomeruli; in parts connective tissue increased from cell proliferation, same as in liver. Pancreas small and hard | Right testicle large, dense, and firm, from white cheesy growths in substance partially softened. Left, smaller but similar deposits | |

| No. of Case. | Age. | Years of Service. | Details of Service in sequence. | Previous History of Disease in sequence. | Where Primary Lesion contracted. | Duration of Lesion. | Duration of last Hospital Admission. |
|---|---|---|---|---|---|---|---|
| 29 | 25 | 8 | Home ..<br>Cape .. | Rheumatism<br>Syphilis, Primary<br>Syphilis, Secondary<br>Nephria | Cape | Nephria, 8½ months | 8 days |
| 30 | 27 9/12 | 4 | Home .. 2<br>Gibraltar .. 2 | Syphilitic lesions<br>Liver enlargement and Ascites<br>Nephria | Gibraltar | Kidney Lesion nearly 12 months | 72 days |
| 31 | 25 | 4 6/12 | Home .. 2 9/12<br>India .. 1 9/12 | Lesion of Lymphatic Glands of Neck, with Ulceration<br>Progressive emaciation, with no definite symptoms<br>Nephria<br>(Post-mortem evidence of Syphilis) | .. .. | .. | 3 months 21 days |

| Predominant Symptoms characterizing last Illness. | External appearance. | Cranium, Spinal Canal, and Contents. | Neck, Chest, and Respiratory Organs. |
|---|---|---|---|
| Emaciation; semi-coma; ascites; œdema; rupia; lesion of liver and kidneys | Girth, 38 inches Weight, 112 lbs. Rupial cicatrices; induration on penis and in groins | Commencing porosity of calvarium, with active congestion of blood-vessels, especially marked over parietal eminences; congestion of pericranium, corresponding to rupial ulcers on skin; congestion of choroid plexus. Brain, 3 lbs. 8 oz. | Thoracic glands enlarged; thyroid also, and indurated; slight deposit in left apex |
| Anasarca, ascites; urine albuminous, sp. gr. 1010; waxy casts, free cells; uræmic poisoning; syphilitic cachexia | Great emaciation | Brain 3 lbs. 5 oz. | Larynx congested; slight adhesions left pleura; thickening of pleura over nodules; nodular deposit in left lung, chiefly pneumonic and hæmorrhagic |
| Cachexia; dysenteric diarrhœa; urine albuminous; specific gravity 1010; fibrinous and pale waxy casts; great drowsiness; œdema; death slow | Emaciation great; sallowness of skin; ulcers on neck; marks of syphilitic ulceration on corona and glans; coppery hue in patches on skin | Calvarium thickened; shavings of bone amyloid; symmetrical gummata towards each lateral margin of frontal bone, with corresponding hyperostosis on inner aspect, and great vascularity and thickening of dura mater; arteries of pia mater much congested over anterior aspect of cerebrum; sinuses full of decolorized coagulum. Brain 3 lbs. | Cervical glands enlarged and filled with concrete yellow material; thoracic glands enlarged; slight adhesions of pleura on right side, near apex |

| No. of Case—*contd.* | Heart and Vascular System. | Peritoneal Cavity. | Alimentary Canal. |
|---|---|---|---|
| *29* | Pericardium adherent to lungs and to heart and large vessels — can only be removed by dissection. Heart small; hypertrophy of left ventricle, forming apex; lining membrane of aorta stained. Measurements, 5 × 3·6 × 3·5 × 9 inches. Weight 9 oz. Orifices—right 1·67 and 1·03; left 1·18 and 1·03 | .. .. | Extensive ulcerations on posterior portion of tongue, with induration of edges; same on both tonsils. Tenacious mucus with blood-like exudation over mucous membrane of stomach; diphtheritic exudation over mucous membrane of ileum, the valvulæ conniventes of which are amyloid; pigmental discoloration of cæcum; colon ulcerated, exposing solitary glands |
| *30* | White spots anteriorly on prominences; decolorized coagula in ventricles; thickening and opacity around mitral valve: steatomatous deposits, with scar-like loss of substance in aorta in vicinity of large vessels. Dimensions, 4·7 in. × 3·1 × 3·6. Diameter of orifices: right 1·45 and 1·32; left 1·03 and ·92 | Contains 40 oz. fluid | Stomach much injected; Peyer's glands atrophied; colon with diphtheritic exudation over surface; ulceration around solitary glands |
| *31* | White spots on surface; decolorized coagula in cavities, extending into pulmonary and systemic vessels; atheromatous deposit in aorta, extending up carotids; substance of heart soft | .. .. | Tongue swollen and tumid; mucous membrane of small intestines anæmic, soft, thin; villi gone; amyloid reaction; Peyer's glands atrophied; solitary glands gone, but position shown by a dark pigmental ring round a central transparent depression; cæcum atrophied, with dark pigmented deposit; colon covered by slimy mucus, with slight ulceration and softening of mucous membrane; solitary follicles atrophied |

| Liver. | Spleen. | Kidneys. | Bladder and Generative Organs. | Joints, Bones and Muscles. |
|---|---|---|---|---|
| 4 lbs. 4 oz. Right lobe hypertrophied; opacity of capsule, with venation of lymphatics; surface rough, from subjacent deposits; substance condensed and firm; interlobular congestion; tissue fatty and amyloid | 10 oz. Extravasated blood in substance; firm, and intensely amyloid | Imbedded in areolar tissue; 11½ oz. Capsule adherent; granular appearance, with surface loss of substance; texture firm; very amyloid; chiefly affecting the straight vessels | .. .. | Enlargement of right elbow joint, and metacarpo-phalangeal articulations; node-like enlargement of bones of forearm |
| 3 lbs. 4 oz. Dimensions, 9·3 × 5·4 × 3·5; form altered by irregular contractions; a cartilagineous-like deposit, 1 inch square, on surface, is separable into dense fibrous plates; connective tissue growth between acini and amyloid deposits in this tissue; none in the lobules which are congested; the liver cells granular, with fatty degeneration | 2 lbs. 2 oz. Covering thickened by several deposits like liver; deposits also in substance of red coloring matter; no sacculi visible; pulp firm and fleshy; great increase of connective tissue | Right 8 oz.; left 8½ oz. Capsule adherent; surface pale and tuberculated from loss of substance; substance granular; great increase of cortical with displacement of pyramids; glomeruli amyloid; cystic degeneration, one ·56 inch in diameter; connective tissue greatly increased | | |
| Amyloid; 52 oz.; transverse 9 1/10 in.; antero-post ·6; vertical 3⅜ | Amyloid. 10 oz. | Irregularly swollen; right 5½ oz.; left 7¼; relation of cortical to pyramidal portion ·3 inches to ·8 inches, amyloid | | |

| No. of Case. | Age. | Years of Service. | Details of Service in sequence. | Previous History of Disease in sequence. | Where Primary Lesion contracted. | Duration of Lesion. | Duration of last Hospital Admission. |
|---|---|---|---|---|---|---|---|
| 32 | 22 | $3\frac{1}{12}$ | Home .. $\frac{5}{12}$<br>Malta .. $2\frac{8}{12}$ | Primary and Secondary Syphilis<br>Rupia<br>Bronchitis<br>Nephria | Home | Nephria 3 years | 4 months |
| 33 | $22\frac{6}{12}$ | $8\frac{10}{12}$ | Home .. $\frac{7}{12}$<br>India .. 7<br>China .. $\frac{9}{12}$<br>Home .. $\frac{6}{12}$ | Ague<br>Syphilis<br>Iritis<br>Nephria | China | Nephria $1\frac{5}{12}$ years | 6 months 5 days |
| 34 | 26 | $9\frac{4}{12}$ | Home .. $1\frac{9}{12}$<br>Mediterranean $5\frac{8}{12}$<br>Cape .. $1\frac{11}{12}$ | Fever (Continued)<br>Syphilis, Primary<br>Syphilis, Secondary<br>Rheumatism<br>Phlegm. Erysipelas | Cape-town | Secondary Lesions 8 months | 17 days |
| 35 | 25 | 8 | Home .. $\frac{5}{12}$<br>Gibraltar .. $1\frac{4}{12}$<br>Cape .. $\frac{8}{12}$<br>India .. 6 | Syphilis, Primary<br>Tonsillitis<br>Orchitis<br>Febris Intermittens | India | .. | 25 days |

| Predominant Symptoms characterizing last Illness. | External appearance. | Cranium, Spinal Canal, and Contents. | Neck, Chest, and Respiratory Organs. |
|---|---|---|---|
| Œdema; anæmia; urine pale, copious, sp. gr. 1010; albumen moderate; effusion into cavities; uræmia | Anasarca; rupial scars | Pia mater amyloid | Slight pleural adhesion right side, very great on left; 5 oz. of serum in left cavity. Right lung with miliary tubercle throughout, with a large nodular growth in apex, yellow and commencing cheesy (syphilitic); puckering over the surface, with a small cavity immediately above; left lung consolidated at base posteriorly |
| Rupial ulcers; splenic enlargement; œdema; albumen in urine, sp. gr. 1004; diarrhœa; dyspnœa; exhaustion | Extreme emaciation; pale cicatrices on face; rupial ulceration on body | .. .. | Mucous membrane of larynx over epiglottis congested; right pleural sac thick, opaque, containing 80 oz., left 20 oz. Substance of lungs healthy, except the deposition of glutinous specks in upper lobe of right lung |
| Syphilitic cachexia; abscess on left leg, with erysipelas; pneumonia; exhaustion | Girth 39 in. Weight 147 lbs. | Calvarium rough on inner surface, the seat of active growth; dura mater adherent to calvarium, with congestion and superficial effusion of blood on inner surface; pia mater congested. Brain 3 lbs. 3 oz. | Larynx cyanosed; cervical and thoracic glands enlarged, thyroid also, and indurated; general adhesions, right pleura; left, free, with 8 oz. of dark-coloured fluid; pneumonic consolidation of lungs at base, with apoplectic effusions. Weight 4 lbs. 10½ oz. |
| Ulcer of throat; ague; enlarged spleen; exhaustion | Marks of ulcers on legs and wrists; ulcers on penis; right testicle indurated | Lymph-like exudation on dura mater following course of blood vessels; dura mater easily separated; commencement of hæmatoma and effusion of blood on brain convolutions; lymphy material surrounding pineal gland. Brain 3 lbs. 8 oz. | Lymphatic glands along vessels of neck enlarged; ulceration of larynx exposing thyroid cartilage; muco-purulent matter in trachea, with much congestion at bifurcation; condensation of both lungs posteriorly, with muco-purulent fluid in bronchi |

| No. of Case—*contd.* | Heart and Vascular System. | Peritoneal Cavity. | Alimentary Canal. |
|---|---|---|---|
| *32* | Pericardium adherent, 1 inch from apex, anteriorly and posteriorly, by fine fibrous bands; heart small. Measurements: vertical 4·7; ventricles 3·4; tranverse 3·3. Diameter of orifices—tricuspid 1·45; mitral 1·18; pulmonary 1·00; aortic 1·03. Weight 7½ oz. | 32 oz. of serum, milky-white and containing sugar | .. .. |
| *33* | White patch; slight opacity of lining membrane of sinus valsalva and aorta | 120 oz. of muco-purulent fluid in cavity | Mucous membrane anæmic; Peyer's patches absorbed |
| *34* | Evidence of pericarditis towards apex, which is formed by left ventricle; white spot on coronary artery; soft dark clots in right side, same in left but firm; right auricular walls thick; chordæ of right ventricle elongated; left ventricle endocardium very thick, with old white opacities and atheromatous degeneration; aorta healthy; heart generally hypertrophied. Weight 1 lb. 3 oz. Dimensions: 6·9 × 5·5 × 6·8 × 14·9 in. Orifices: right 1·83 and 1·67; left 1·32 and 1·03 | 20 oz. of dark fluid | Cicatrices on tonsils; small intestines atrophied; mucous membrane anæmic; iodine reaction in colon |
| *35* | Serum 2 oz. in pericardium; decolorized clot in right heart; apex formed by left ventricle; commencement of corrugation and loss of substance in aorta. Dimensions: 4·9 × 3·7 × 3·8 × 8.11. Weight, 8¼ oz. Orifices: right 1·45 and 1·18; left 1·18 and 1·03 | Omentum drawn up and firmly attached to a cicatrix of liver; hardening and enlargement of glands of mesentery | Ulceration of tongue; ulceration and gangrenous destruction of pharynx, with elongated ulcers throughout |

| Liver. | Spleen. | Kidneys. | Bladder and Generative Organs. | Joints, Bones and Muscles. |
|---|---|---|---|---|
| 5 lbs. 2 oz. Pale, granular; acini very distinct, exhibiting dense white streaks between them; intense iodine reaction; loss of substance on anterior part of right lobe with a sulcus equalling $\frac{5}{16}$ths inch in extent | .. .. | Each 9½ oz. Capsules loaded with fat externally; small depressions on surface; stellate congestion; minute white specks (glomeruli) shine through; amyloid. In the cortical substance between the pyramids are small white spots of fleshy hue, with intense iodine reaction: the microscope shows them to consist of intertubular deposit of some form of albumen, resisting æther, potash, acids, and becoming granular on boiling | | |
| 5 lbs. Acini distinct, surrounded by pale-coloured development of tissue (interlobular parenchymatous deposit) | 17½ oz. Generally enlarged | Left 5 oz., right 8¾; cortical substance pale yellow, pyramidal, red; capsule easily removed; considerable loss of substance; great displacement of pyramids by enlargement of intermediate cortical substance; glomeruli amyloid | Deposits in testicles | Head of fibula enlarged; nodular gummata on edge of left patella and on right tibia; nasal cartilages absorbed; turbinated bones of ethmoid destroyed |
| 3 lbs. 3½ oz. Soft, commencing atrophy; nutmeg congestion; fatty degeneration, with slight amyloid reaction | 11 oz. Adherent to diaphragm; amyloid | 13 oz. Stellate congestion, soft; congested at junction of cortical and pyramidal portions; substance pale; epithelium very fatty, with fibrous matrix greatly increased, unduly separating the tubes | Testes considerably indurated, with syphilitic deposit in both | Abscess and inflammatory infiltration of left leg; lymphatic glands in popliteal space in a state of suppuration; femoral vein in lower one-third plugged by firm coagulum |
| 3 lbs. 12½ oz. Contracted to a globular mass; left lobe very small; cicatricial contraction near lower margin and on anterior surface, right lobe, with circular depression | 2 lbs. 2 oz. 8·9 in. long × 5·2; anterior edge projects beyond middle line and 2 inches below cartilage of ribs; capsule opaque | 12¼ oz. Capsule congested; does not separate without tearing substance | Cartilagineous hardening of right tunica vaginalis, with deposits in testicle of an early stage; left, with two or three deposits further advanced | |

| No. of Case. | Age. | Years of Service. | Details of Service in sequence. | Previous History of Disease in sequence. | Where Primary Lesion contracted. | Duration of Lesion. | Duration of last Hospital Admission. |
|---|---|---|---|---|---|---|---|
| 36 | 25 | 4 | Home .. $\frac{3}{12}$<br>India .. $3\frac{9}{12}$ | Primary Syphilis<br>Secondary Syphilis<br>Dysenteria Acuta (4 times) | Bombay | $3\frac{1}{2}$ years of Dysentery | ? |
| 37 | 40 | 5 | India .. 3<br>Home .. 2 | Syphilis<br>Dysentery | India | ? | 3 months 9 days |
| 38 | 33 | 16 | Home .. 9<br>Crimea .. 1<br>Home .. 1<br>India .. 5 | Primary Syphilis<br>Secondary Syphilis<br>Dysenteric Symptoms | India | ? | ? |

| Predominant Symptoms characterizing last Illness. | External appearance. | Cranium, Spinal Canal, and Contents. | Neck, Chest, and Respiratory Organs. |
|---|---|---|---|
| Dysenteric symptoms; anæmia; cough | Girth 29 inches<br>Weight 65½ lbs.<br>Purpuric discoloration of skin around ankles; bed sores; cicatrices on penis; induration of glands in groin | Calvarium hypertrophied posteriorly, with thinning at vertex; pacchionian glands enlarged, especially on right side; dura mater, with cicatricial loss of substance covering the convolutions anteriorly, and also corresponding to enlarged glands; much congestion in vicinity of longitudinal sinus; extensive sub-arachnoid effusion; pia mater adherent anteriorly to dura mater, and at this spot the convolutions are soft and congested; convolutions small, atrophied, anæmic; pineal gland soft; ventricles contain 4 oz. fluid<br>Brain 3 lbs. 1¼ oz. | Left pleura contains 60 oz. of fluid; right 23, rather bloody. Purpuric spots on right pleura, visceral and parietal; lungs crepitant only one-third, chiefly at apex; apex of left lung contains two condensed nodular deposits, and one in right, the size of filberts, and extending not far below the surface of pleura; similar in microscopic characters to those in testicles |
| Syphilitic cachexia; enlargement of liver and spleen; dysenteric symptoms | Emaciation | .. .. | Left pleura containing large quantity of serum; right small |
| Syphilitic cachexia; dysentery; exhaustion | Girth of chest 32 in. Surface studded with cicatrices of Syphilitic eruptions | Arachnoid very opaque in parts. Brain congested on surface; 3 lbs. 6 oz. | Mucous membrane of trachea vascular; firm adhesions of right pleura; bronchi vascular; lungs 3 lbs. 1 oz.; black deposit in lymphatics at root of lungs |

| No. of Case—*contd.* | Heart and Vascular System. | Peritoneal Cavity. | Alimentary Canal. |
|---|---|---|---|
| 36 | Pericardium contains 4 oz. of fluid; cicatrix with loss of substance in aorta<br>Dimensions, 4·4 × 3·2 × 2·9 × 7 circumference<br>Orifices—right 1·32 and 1·30<br>left 1·03 and ·92 | Mesenteric glands enlarged, similar to testicles | Mucous membrane of small intestines atrophied; miliary spots in the omentum; tranverse colon contracted, the mucous membrane presenting very red, irregular elevations, almost warty; remains of ulceration, and much pigmentary deposit; towards rectum ulcers very evident |
| 37 | Firm coagulum in inferior cava and mesenteric veins | .. .. | Glands of small intestines very vascular; colon extensively ulcerated, as small superficial pits; calibre irregularly contracted, with thickening of substance |
| 38 | Much fat on anterior surface; decolorized coagula in cavities; normal | Clear fat in meshes of omentum of a greenish colour | Considerable blackening of cardiac end of esophagus; white granular deposit in mucous membrane of duodenum; loss of substance in lower part of ileum; cicatrices of old ulcers. Peyer's glands filled with a white deposit; thickening of tissues of colon, the effects of general diphtheritic exudation, with small circular ulcers and cicatrices of old ones, extending also along rectum |

| Liver. | Spleen. | Kidneys. | Bladder and Generative Organs. | Joints, Bones and Muscles. |
|---|---|---|---|---|
| 3 lbs. Adherent to diaphragm, consequent on tubercular inflammation of opposing surfaces; fine granular growths in peritoneal covering; substance at adherent portions friable; texture generally fatty | 5 oz. Hæmorrhagic appearance of pulp corresponding to glomeruli; some solitary yellow deposit in substance | 11¼ oz. Capsule adherent, tearing cortical portion, which is enlarged, dense, and granular. By microscope, the walls of tubuli are thickened, especially the very granular; glomeruli enlarged, and substance infiltrated with very fine granular matter | A leposit of white, cheesy, tolerably firm material in left testicle, size of a pea, and irregular — one in right somewhat smaller, each surrounded by a brownish circle. Microscope, amorphous granular matter, with small corpuscles, somewhat granular on surface; no reaction with acetic acid; towards centre are fat globules and granules | Cartilages of ribs show fatty degeneration of matrix, with fat globules in cells |
| 2 lbs. 15 oz. A white cicatrix on superior surface, extending from posterior border 4 in., with a depression from loss of substance at each end, where it is attached to diaphragm by vascular adhesions — depressions corresponding to white and yellow masses in liver substances, causing degeneration, and accompanied by a cicatrix throughout whole length, and ¾ inch on either side; general substance pale fawn colour, but that surrounding cicatrix dark brown, and giving a faint reaction with iodine | | | | |
| 3 lbs. 10 oz. Development of interstitial tissue throughout, section similar to "arbor vitæ"; darker parts contain much black and brown pigment; cells atrophied, extremely granular (interstitial hepatitis); surface of a cicatriform appearance in many places | 15 oz. White deposit on surface near diaphragm; glomeruli very obvious and white; parenchyma infiltrated throughout with dark pigment in fine cells which are enclosed in a larger cell; substance generally pulpy and mulberry hue | 12 oz. Capsule adherent, and tears tissue on removal; cortical portion tumid, tubes filled with granules and oily matter; glomeruli vessels clear; capsules granular | Yellow deposits in testicles | |

| No. of Case. | Age. | Years of Service. | Details of Service in sequence. | Previous History of Disease in sequence. | Where Primary Lesion contracted. | Duration of Lesion. | Duration of last Hospital Admission. |
|---|---|---|---|---|---|---|---|
| 39 | 24 | $6\frac{1}{12}$ | Home .. $1\frac{1}{2}$<br>India .. $4\frac{5}{12}$ | Primary and Secondary Syphilis<br>Bronchitis<br>Febris Cont.<br>Dysentery | India | 14 months, Dysentery | 7 days |
| 40 | 29 | $6\frac{5}{12}$ | Home .. $\frac{1}{12}$<br>India .. $6\frac{4}{12}$ | Primary Syphilis<br>Phthisis<br>Secondary Syphilis<br>Dysentery | India | ? | ? |
| 41 | 27 | $7\frac{5}{12}$ | Home .. 2<br>India .. $5\frac{5}{12}$ | Malarial Fever<br>Primary and Secondary Syphilis<br>Splenic enlargement<br>Dysentery | India | ? | ? |

| Predominant Symptoms characterizing last Illness. | External appearance. | Cranium, Spinal, Canal, and Contents. | Neck, Chest, and Respiratory Organs. |
|---|---|---|---|
| Anæmia and syphilitic cachexia; ulceration of soft palate; intense headache; dysenteric stools | Extreme emaciation; cicatrices on penis and groins, with much loss of substance; nodes; skin ulceration, and coppery eruption | Calvarium dense and heavy from general growth of bone; inner surface porous<br>Brain 3 lbs. 4 oz. | Right pleura adherent, containing 9 oz. serum; pneumonic consolidation of right base; left, with small gangrenous patches size of bean, in posterior part; no tubercle<br>Lungs 3 lbs. 7 oz. |
| Ascites; dysenteric symptoms; exhaustion; intellect clear | Girth 32 inches<br>Weight 88½ lbs.<br>Cicatrices on penis and groins | Firm coagulum in basilar artery; great discoloration of right optic thalamus; cerebral ganglia softened, with apoplectic clots in their substance | Œdema of mucous membrane of larynx; deep ulceration at posterior aspect of vocal cords; vascularity of trachea, and minute general ulceration throughout whole tube; extensive adhesion at left apex, and over whole right pleura; miliary tubercles dispersed over lungs, with cavity in left apex and cretaceous material in right |
| Dysenteric symptoms added to syphilitic; great hypochondriac tenderness | Girth 30 inches<br>Weight 94 lbs.<br>Much emaciation | Porosity of inner table; pia mater congested. Brain 2 lbs. 15 oz. | Anterior mediastinal glands enlarged; base of lungs adherent to diaphragm; purulent matter in right bronchus; cicatrix in right apex; pneumonia in the remainder of tissue; left lung healthy |

| No. of Case—*contd.* | Heart and Vascular System. | Peritoneal Cavity. | Alimentary Canal. |
|---|---|---|---|
| *39* | Small; weight, 7¼ oz.; aortic corrugation | 21 oz. greenish fluid | Great loss of substance of tonsils; ulceration of fauces and pharynx; small intestines diaphanous, wasted, amyloid. Peyer's patches atrophied; occasional small solitary ulcers surrounded by vascular ring in large intestines which are slightly amyloid |
| *40* | Fluid in pericardium; dark coagulum in ventricles and auricles. Weight 8½ oz. Dimensions, 5·2 × 3·6 × 3·7 × 9·6. Orifices: right 1·67 and 1·18; left 1·45 and ·92 | 40 oz. serum. | Considerable congestion at root of tongue, pharynx, and esophagus; remains of ulceration at caput cæcum and throughout whole large intestines to rectum; thinning of mucous membrane |
| *41* | 9 oz. Fat on surface; atheroma in aorta. Measurements, 4·4 × 3·6 × 3·6 × 8·7. Orifices: right 1·45 and 1·03; left 1·18 and 1·03 | Fluid in abdominal cavity | Ecchymosis beneath mucous membrane of stomach; blood vessels amyloid; mucous membrane of small intestines anæmic; diphtheretic exudation in parts. Villi gone, amyloid; ulcerated masses and circular cicatrices in large intestines isolated, and apparently connected with solitary glands |

| Liver. | Spleen. | Kidneys. | Bladder, and Generative Organs. | Joints, Bones and Muscles. |
|---|---|---|---|---|
| 3 lbs. 15 oz. Marked on surface by small yellow granular nodules; interlobular congestion; section yellow, mottled (cirrhotic) | 1 lb. 2½ oz.; texture dark chocolate, soft but tough; no sacculi visible | 13 oz. Stellate congestion of cortical substance; anæmia of pyramids; amyloid, mainly about vasa recta and glomeruli | Testicles enlarged, surface nodulated; yellowish deposit; whole substance involved in the growths, which are laminated; the left beginning to soften | A node on frontal bone made up of small gummatous nodules, very distinct, and markedly reacting with iodine |
| 4 lbs. 4 oz. Cicatricial depression, right lobe; soft, nutmeg; intense amyloid reaction | 11 oz. Clear slate-coloured, sacculi not obvious; intensely amyloid | 14 oz. Glomeruli amyloid; cortical bloodless, with commencing loss of substance; general anæmia of tissue | | |
| 4 lbs. 10 oz. Right lobe enlarged; substance fatty; cicatrix on surface; bright yellow color, from retained bile; intensely amyloid; a syphilitic nodule in substance | 15 oz. Intensely amyloid | Both 8½ oz. Anæmic, firm; cortical substance intensely amyloid | | |

## APPENDIX No. XI.

## MEDICAL HISTORY OF THE RED RIVER EXPEDITION, IN THE MONTHS OF MAY—OCTOBER 1870.

By Surgeon-Major E. W. Young, M.D., 1st Battalion 60th Rifles.

Introductory.

This expedition was undertaken by the Imperial Government, in conjunction with that of the Dominion of Canada, under the following circumstances:

The little settlement founded in 1812 by Lord Selkirk in Rupert's Land on the banks of the Red River, and named after himself, "Selkirk Settlement," has subsequently been known by the name of "Assiniboia," or more popularly by that of the "Red River Settlement." The land originally purchased by Lord Selkirk was re-purchased from his heirs by the Hudson's Bay Company, under whom the affairs of the colony have hitherto been managed, by means of a Governor and an Executive Council. The population, a very mixed one, is estimated to amount to about 10,000, speaking French, English, Gaelic, and various American-Indian languages and dialects. Amongst the English-speaking population, the Scotch form a very considerable element. Intermixture between the British or French settlers with the various Indian tribes has resulted in a very numerous population of half-breeds, who in many cases are named after their English or French progenitors, and to a certain extent speak the paternal language in addition to the Indian dialect of their maternal tribe.

The Hudson's Bay Company having lately sold their territory to the Canadian Government, certain agitators confiding in the distance of the settlement from the Dominion, and the extreme difficulty of intercommunication, raised a party to oppose the entrance of the newly appointed Governor. Under the leadership of a French Canadian named Louis Riel, associated with one or two other French Canadians, and an Irish American Fenian, a band of several hundred half breeds of French descent surprised and seized upon Fort Garry, the principal stronghold of the colony, with all its guns, muskets, and ammunition, retaining the late Governor, who was in a dying state, a prisoner at his residence within the Fort, and laid the Hudson's Bay Company—one of whose principal stores was in the fort—under contribution for a considerable sum of money to supply their necessities. They formed themselves into an executive government, of which Riel constituted himself the President, a guard of 50 men with a commandant was constantly maintained within the fort, and some 50 or 60 of the loyal inhabitants surprised and imprisoned and their goods seized. One of these prisoners, a native of Ontario, was tried by a so-called court-martial, sentenced to death and shot. Being supported in these proceedings by the greater number of French half-breeds in the settlement, who were armed from the stores in the fort, the "President" became a terror to all the loyal colonists, and it became necessary to send a force to their assistance.

The Dominion Parliament passed an Act incorporating the settlement with Canada, under the name of "Manitobah," and establishing equitable regulations for its government, and it was resolved that a force composed partly of Imperial Troops, partly of Canadian Militia Volunteers, should be despatched to Fort Garry to expel the rebels and restore order.

Two military expeditions had been previously despatched to this colony namely, the 6th Regiment in 1846, and the Royal Canadian Rifles in 1860.

On each of these occasions the route taken was by way of Hudson's Bay and the York Factory by sea and up the Hill River to Lake Winnipeg and Red River; but as only one voyage can be made in the season by this route, and as it was intended that the Regular Troops of the present expedition should return before winter, this way was plainly unadvisable. The most expeditious way, and that usually pursued, was through the United States, by the chain of railways to Chicago, and thence to St. Cloud; from the latter station, a practicable road of about 418 miles in length leads to Fort Garry through Pembina on the frontier, which latter town (or rather village) is distant from the fort about 61 miles. A canoe route by way of Pigeon River from the western shore of Lake Superior, could not be adopted in the present instance, as a portion of its course was through United States territory, and also because for about 150 miles it skirts the boundary line. Mr. Dawson, a well-known civil engineer, had for some years past been employed in the survey of the various known routes, and had recommended to the Department of Public Works what he considered to be the most eligible road for emigrants from Canada to the settlement; his line of route had met with the approval of the Canadian Government, and already considerable progress had been made in works required to render it practicable. It is a modification of the old canoe routes used by the Hudson's Bay and North-West Companies; in order to avoid the extremely difficult and dangerous navigation of the River Kaministiquia, he proposed to form a road from Thunder Bay, an outlet from the west side of Lake Superior, by which passengers should be conveyed by land to the water-route above that river. Mr. Dawson having undertaken that this route should be in readiness for the passage of the troops, this route was finally adopted.

Various routes.

Choice of route.

Colonel Wolseley, Deputy Quartermaster-General in Canada, was appointed to command the expedition, and it is understood that to him was entrusted the drawing up of the plans and details of the same. Probably no arrangements for the preparation and carrying out of so difficult an undertaking as the passage of such an expedition through an uninhabited country, through lakes and rivers but partially explored, and bounded by trackless forests, destitute of supplies of all kinds for upwards of 600 miles, could have been more skilfully made and more successfully executed. Boats to the number of about 150 were ordered from various builders in Canada, sufficiently large to carry the troops with their supplies, and yet small enough for their passage through the numerous shallow waters along the route, and at the same time not too unwieldy to be transported over land by the troops at the different "Portages." Wagons and carts, with harness, &c., for the transport of stores, boats, &c., across the Thunder Bay road were equipped, and steamers and other vessels provided as transports from Collingwood, the port of embarkation nearest to Toronto, the starting point of the expedition.

Preparations for Expedition.

By General Order, published at Montreal on the 10th May, 1870, it was stated that it had been decided that a force of Regulars and Volunteers should be sent to the Red River Settlement, and that Colonel G. J. Wolseley, Deputy Quartermaster-General had been appointed by the Lieutenant-General Commanding, with the approval of His Excellency the Governor-General, to command the expedition.

General Order detailing Expedition.

The force to consist of a detachment Royal Artillery under Lieutenant Alleyne.

A detachment Royal Engineers under Lieutenant Heneage.

7 companies 1st Battalion 60th Rifles, under Colonel Feilden.

Detachment Army Hospital Corps, and Army Service Corps, under Assistant-Controller Irvine.

A battalion Militia under Lieutenant-Colonel Jarvis.

" " Lieutenant-Colonel Casault.

*Medical Officers.*

Surgeon-Major Young, M.D., 60th Rifles, Principal Medical Officer.

Assistant-Surgeon Oliver, M.D., do.

" Shaw, R.A.

" Robertson, M.D., Staff.

" Chatterton, M.D., do.

The following daily ration to be issued from date of force leaving Toronto, and granted free of charge to non-commissioned officers and privates :—

1 lb. biscuit, or 1½ lb. bread.
1 lb. salt pork, or 1½ lb. fresh meat.
2 oz. sugar.
1 oz. tea.
½ oz. salt (when fresh meat is issued).
½ pint beans, or ¼ lb. preserved potatoes.
$\frac{1}{36}$ oz. pepper.

Tobacco and soap to be provided by the Control Department for purchase by the troops.

In consideration of the special nature of the service, the Secretary of State for War has sanctioned the issue of the following necessaries free of cost to all non-commissioned officers and privates of the Regular Force, and a similar arrangement has been made by the Dominion Government for the Militia :—

| | |
|---|---|
| 1 serge frock. | 2 pairs worsted socks. |
| 1 woollen night cap. | 1 clasp knife. |
| 1 pair serge trowsers. | 2 flannel shirts. |
| 1 cap-cover with peak. | 1 tin cup. |
| 1 pair ox-hide boots. | 1 housewife. |
| 1 piece mosquito netting. | 1 tin plate. |

Extraordinary field allowance for 6 months to all officers appointed to take the field.

90 lbs. weight of baggage only allowed to each officer, to include bedding and cooking, and messing utensils.

All company officers to be armed with rifles, and to carry 60 rounds of ammunition like the men.

Plan of Expedition.

The plan of the expedition was as follows:—The troops to proceed from Collingwood, a distance of 94 miles from Toronto by railway, in steamers by way of Georgian Bay, Lakes Huron and Superior to Thunder Bay (on the western side of the latter lake) where they were to disembark at the eastern end of the road already referred to. A camp there to be formed to await the arrival of all the necessary stores and boats, thence to be transported by wagons to the western extremity of the road on the shores of Lake Shebandowan. The troops were then to embark by detachments daily, until all had departed. It was at first proposed to establish a line of detachments at various "Portages" along the route, between the starting point at Lake Shebandowan and Fort Francis, a station of the Hudson's Bay Company on the banks of Rainy River, for the purpose of passing on stores to that station, which may be roughly stated as half way to Fort Garry, and to establish there a depôt for military stores, provisions, &c., but this plan was subsequently abandoned, and it was determined that the detachments should proceed at once to their destination without delay.

Preliminary medical arrangements.

Inspector-General of Hospitals McIllree named the Medical Officers, and made the arrangements for the medical and surgical equipment, medical comforts, tent equipage, &c., necessary for the establishments of a field hospital at Thunder Bay, and at Fort Francis, and also for the requirements of the Medical Officers both of the Regular and Volunteer Troops. The supply of everything was more than ample for the requirements. The medical stores and comforts were packed in cases not exceeding 90 lbs. in weight, when required to be conveyed by boats. * * * * * *

Instruction to Medical Officers.

On joining the General Head-quarters at Toronto a few days prior to the departure of the force, I forwarded, as desired by the Inspector-General of Hospitals, to each Medical Officer a written request that he would keep a diary to record in detail the events of the expedition, medical or otherwise, the account of marches made by the troops, the nature of the country passed through, character of the scenery, quality of provisions, water, &c., and their effects upon health, climate, amount of labour performed by the men, &c., &c. The detailed accounts of the different detachments thus recorded are very interesting.

Detachment at Sault Ste. Marie.

At the onset, a difficulty presented itself, in the fact that in the preliminary passage of the troops from Toronto to Thunder Bay, by way of Collingwood, the canal by which vessels are conveyed between Lakes Huron and Superior to

avoid the Falls (the Sault Ste. Marie) which separate these lakes, is in United States territory, and the conveyance of troops and warlike stores through this canal was objected to by the American authorities. It was therefore necessary that all such should be transported by land on British territory from one side of the Sault to the other, a distance of 2 miles. As a protection to the stores that would thus require to be conveyed, and to assist in their transit, it was considered necessary to station a small military force there. Accordingly on the 14th May, 2 companies of the 1st Ontario Battalion of Rifle Volunteers under the command of Lieutenant-Colonel Bolton, Deputy Assistant Adjutant-General, were despatched thither. The Hospital Serjeant of that battalion (a qualified medical man) went in medical charge. On the 16th of the same month, 2 more companies of the same battalion, under the medical charge of the Surgeon (Dr. Codd) proceeded on the same duty.

Departure of Head-Quarter Staff.

The arrangements for the final start being completed, and a careful medical inspection of the troops having been made, Colonel Wolseley and Staff, including the Chief Control Officer and myself, with one company 1st Battalion 60th Rifles, and Staff Assistant-Surgeon Robertson, left Toronto on the morning of the 21st May, and embarked at Collingwood that evening on board the "Chicora" steamer for Thunder Bay; four other companies of the 60th Rifles, with the detachment of Army Hospital Corps and Army Service Corps, embarked on the same day in the steamer "Frances Smith." After traversing Georgian Bay and Lake Huron, landing and transporting all the military stores across the Sault Ste. Marie by land, re-shipping and sailing through Lake Superior and Thunder Bay, the head-quarters arrived at the eastern termination of the partly made road on the 25th May, where they landed and formed an encampment. Colonel Wolseley bestowed on the infant port the name of "Prince Arthur's Landing." The men were immediately set to work preparing shelter for the stores of provisions, horses, &c. A field hospital was established, and placed under the charge of Staff Assistant-Surgeon Robertson, M.D., latrines were made and drains dug for use of the camp, which was in circumscribed ground, a clearing from the dense forest, sloping towards Thunder Bay on the eastern aspect, surrounded on the other three sides by forest trees lately blackened and partly consumed, partly prostrated by an extensive conflagration which had spread devastation around for some 30 miles a few days previously.

Dep
Tro

Prince Arthur's Landing, Thunder Bay

Prince Arthur's Landing is about four miles north of Fort William, one of the principal depôts of the Hudson's Bay Company, situated near the mouth of the River Kaministiquia in latitude 48° 23½′ N., and longitude 89° 22′ W. In geological formation, it forms part of the Huronian system of rocks in the lower Silurian division, and appears to consist of an argillaceous slate, covered with loam and peat. Here and there intrusive granite rocks crop up above the surface. Numerous small streams intercepted by fallen trees produce a somewhat marshy soil, especially towards the northern portion of the camp. The many drains dug by the troops during their stay caused considerable improvement in this respect. The scenery of the bay is very bold and rugged; Thunder Cape is 1,350 feet in almost perpendicular height, and numerous bold promontories and islands, principally of trap-rock, granite, jasper conglomerate, and Huronian slate, generally covered with dense woods of firs, pine, and birch abound. The whole region is rich in minerals; one silver mine, worked by a Montreal company is situated about six miles north of the camp; another, lately purchased by a company from the United States, is in a very small rocky island close to Thunder Cape, some 60 by 30 feet in dimensions, which yields a large amount of silver, extracted principally below the level of the lake; as much as 70 per cent. of silver is stated to have been extracted from this ore.

Arrival of Force at Thunder Bay.

The whole of the Regular Troops, including the detachments Royal Artillery and Royal Engineers, had arrived by successive detachments on the 1st June. On the 3rd of that month, four companies of the 1st Ontario Rifles arrived, and were encamped on the banks of a small trout stream, about a mile to the north of Prince Arthur's Landing, on a pleasant green sloping bank, sufficiently clear of forest for the purpose, and by the 21st June, the whole force had arrived, consisting of 1 Regular Regiment and 2 Volunteer Regiments of Infantry, each having a uniform strength of 350 non-commissioned officers and men; detachment Royal Artillery and detachment Royal Engineers, 19 non-

Force at Thunder Bay.

commissioned officers and men of each corps; with a staff, under the Control Department, of Army Hospital Corps, and Army Service Corps. Besides the troops, there were very numerous camp followers, voyageurs, teamsters, &c., probably amounting to more than 500.

Thunder Bay Road.

The road by which our passage to the lakes was to be effected was stated on our arrival to be good for some 26 miles, tolerably good for about 10 miles further, the remainder was scarcely commenced, and for the last 10 or 12 miles (out of the total of about 48 miles), it was still virgin forest. Numerous parties of Iroquois Indians and Canadians were employed upon it under Mr. Dawson, and Colonel Wolseley at once saw the necessity of setting the troops to the same laborious work. From the 28th May, companies were detached to various parts of the road for this purpose, and the labour of the men, exposed to the weather, to the attacks of flies, &c., was very great. The work of transporting stores was commenced as soon as sufficient progress in the work would permit, and the work of erecting shelter for the stores, stables for the numerous horses, building a cook-house, and laying floors in the marquees for the field hospital, building a stockaded fort under the superintendence of the Royal Engineers, instruction of the Volunteers in gun drill by the Royal Artillery (as to them was to be confided the care of the mountain guns after the departure of the Regular Troops) went on briskly.

The weather was unfortunately wet, and the newly-made road, unequal to the large traffic, consisting principally of a soft argillaceous soil, soon broke up, under the rain, into an almost impassable mud, the horses sank to their girths in many places, and the wagons could not proceed. Numerous horses were laid-up sick, and a complete stand-still threatened. Under these circumstances it became evident to Colonel Wolseley that, unless some other means of conveyance for the boats at least could be found, the expedition would be delayed until the season was too far advanced for its return before winter. Many persons experienced in the passage of these waters affirmed their conviction that under no circumstances could the journey be performed before the winter frosts set in. The route by way of the River Kaministiquia suggested itself to Colonel Wolseley and, although by many it was deemed madness to attempt it with our boats, by the advice of Mr. McIntyre, the Hudson's Bay Company's Officer in charge of Fort William, the attempt was made.

Kaministiquia River route.

The first party of adventurers along this route consisted of 34 men of the 60th Rifles, commanded by Captain Young, who volunteered his services for this duty. They started from Prince Arthur's Landing on the 4th June, with 2 large boats, and 4 small flat-bottomed boats, carrying 36 days' provisions; Staff Assistant-Surgeon Dr. Chatterton in medical charge; 18 Indians from the mission near the fort were engaged as guides and voyageurs by Mr. McIntyre. For the first 10 miles, the river had a very winding course, its banks being for the most part low with alluvial soil, and occasional high clay banks appearing, all clothed with thick fir, birch, and poplar growths. At about, 6 miles from the fort, McKay's Mountain, with an elevation of about 1,000 feet, clothed with maple trees and firs was passed. The river is here about 130 yards wide, with a moderate current for the first 10 miles of its course—for the next 12 miles, a very strong rapid current and shallows prevail; progress by towing and poling principally—then a partial unloading of the boats was required, and the stores conveyed by land for 350 yards, and more rapids until the foot of the Kakabeka Falls was reached, a magnificent cascade of 121 feet perpendicular height, at a distance of nearly 26 miles from Fort William. Here the first "Portage" was made, in length nearly a mile, up a steep hill at a gradient of about 33° generally, but occasionally the angle was much greater.

Kakabeka Falls.

Portage.

Portaging.

This being the first "portage" made, a short account of the proceedings rendered necessary in this and in all the numerous portages hereafter encountered appears necessary. In the first place, all the barrels and bags of provision, bags of bedding, knapsacks, ammunition boxes, arm-chests, oars, masts, sails, &c., are landed. Parties of men are then busily employed clearing a road by removing brushwood or trees; then trees are felled to form "skids" or runners for the boats' keels to be drawn over, which are laid on the road at right angles to its course, at equal distances apart. The baggage is then carried to the further side of the portage by the men, the most approved method of doing which is by means of "tomplines," or portage straps of tough leather with long ends, the centre of which rests against the forehead, the ends being

firmly tied round the weight to be carried; the latter is then hoisted on the man's back. The safest way to carry a heavy weight, such as a barrel of pork (nearly 200 lbs.), which, if tightly secured to the man carrying it, might endanger breaking his neck if his foot should slip, is to arrange some comparatively light weight—a bag of bedding for example—to the ends of the portage straps, and adjust it to a convenient height on his back, and on this substructure to place the heavy barrel or other heavy weight to be carried. Should the man then stumble the weight being loose falls to the ground without injuring him. Many men are not equal to the exertion of carrying such heavy weights, for such, a couple of poles connected by ropes, a convenient distance apart to admit of a barrel being laid between them, was provided; two men in this case carrying the weight between them. All the stores having been conveyed across the portage, the next thing to be done is to transport the boats; to do this, a tow-line of sufficient length is securely attached to the stem-post by a hole drilled near the keel, and also to one or two of the foremost thwarts. The men then harness themselves to the tow-lines by means of their portage straps slung across one shoulder. A couple of men attach themselves to the bow in order to lift it over any obstacle, and two or three men support it on each side to retain it perpendicularly on its keel. At a given word of command all haul together, and the boat is dragged over the "skids." It is surprising to see how quickly a heavy boat can be transported in this manner. In a steep rise, of course, a very strong force is required, and sometimes the crews of two or more boats are required for each; but in tolerably level ground generally one crew suffices. In descending a very steep incline there is the danger of the weight moving too fast, and a line from the stern wound round a tree, and gradually unwound lessens the force of the descent.

Ecarté Portage.

After this obstacle was overcome, another half-mile of a pretty strong current brought them to a succession of cascades, which entailed another portage (Ecarté portage) of nearly three-quarters of a mile. In the next six miles four more portages, varying in length from 40 to 500 yards each, five rapids, requiring the boats to be towed for the most part, and a strong current in shallow rocky water occurred. One more portage (of stores only) after this brought them with hard rowing to the Kaministiquia Bridge, a substantial structure of "crib-work" piers filled with stones and wooden superstructure and road way, where the road crosses the river, which is here about 100 yards wide. This bridge, about 21 miles by road and 40 miles by the river, gave its name to a temporary camp, where the stores made a short rest, awaiting the means of proceeding further. Here the men encamped for a short time after their labours. When it is considered that, in addition to the work above mentioned, the towing-path, for some time disused, had to be re-formed by felling trees, removing brushwood, &c., the men having constantly to cross creeks above their middle in water, sometimes even swimming, and that many of the soldiers had taken oar and axe in their hand for the first time, and also that the weather was alternately very hot and sultry, or wet and chilly, and that all the time they were exposed to excessive annoyance from mosquitoes, sand flies, and other winged tormentors, frequently preventing sleep, and some idea may be formed of the difficulties encountered. The men worked cheerfully from daylight until dark, and the Indians afforded invaluable aid.

Portages and Rapids.

Kaministiquia Bridge.

The route by the river having been thus proved to be practicable, other parties were from time to time sent forward in the same way. The third company, commanded by Captain Dundas, 60th Rifles, which travelled by that route met with very bad weather. During a violent thunder storm in which the river suddenly rose 5 feet, they had a narrow escape of having their camp washed away; they had to make fresh towing-paths, the former ones being inundated, and were 11 days on the journey in consequence, instead of six, but brought their boats safely to their destination. On the 4th July the last detachment of boats left Thunder Bay by this route; this and several of the preceding being in charge of companies of the Volunteers. Of course, in so rough a journey, many of the boats were more or less injured, but in nearly every case they were capable of being repaired.

River Matawan.

The river route was found to be available for 6 miles further by means of the River Matawan, which flows into the Kaministiquia, some half a mile above the bridge, and accordingly all the boats on arriving there were despatched to this point, where the road crosses the latter by means of another

Matawan Bridge.

bridge similar to the former, of about 60 yards in length (the Matawan Bridge), where another temporary depôt for stores and another camp were formed. Captain Young's services were here again called into requisition. He was sent to explore the upward course of the river, and found that for about 3 miles further the stream, although encumbered with rapids, was practicable, and he was employed with his company conveying boats laden with stores to that point, on the edge of the road, which was called "Young's Landing." In 10 days he had thus conveyed 600 barrels of pork, making two journeys backwards and forwards daily. Here another temporary depôt was established. Beyond this point the river runs through a gorge, but empty boats were with much labour conveyed through to the next practicable channel, where a cross road, called Brown's Lane, was made to join the main road. From thence, on the arrival of stores at this point the boats were laden and conveyed through a succession of dangerous rapids, a distance of about 8 miles, to the Oskondagee Creek, beyond which the river passage was impracticable until near the head waters of the river at its exit from Lake Shebandowan. Between these two points, a distance of about 5 miles, all the carriage was by land.

Young's Landing.

Brown's Lane.

Oskondagee Creek.

Henceforth the trrops were sedulously employed, a part in these operations by water, the remainder in filling up and making practicable the mud holes in the road, forming culverts, laying "corduroys," digging drains, &c. The Head-Quarter Staff moved to the camp at the Matawan Bridge on the 5th July, and the boats and stores being by that time in great measure well on their way to the last stage on the road, Colonel Wolseley established his head-quarters on the 14th July at the latter point, known as "Dam-site," being immediately above a narrow rapid and *chute* in the stream, which Mr. Dawson proposes as the site of a dam to raise the waters of the lake for the purpose of improving the navigation. Here, as fast as the boats arrived, they were inspected and their many damages repaired, and as speedily as possible loaded and conveyed, under the guidance of Lieutenant St. Maur, 60th Rifles, up several strong rapids, to the final point of departure on the shores of the Lake, called "M'Neill's Landing," some 4 miles further on, where Lieut.-Colonel M'Neill was in command. At this time the road stopped short at the dam-site, and a more winding path, partly through a swamp, formed the land communication through the Forest with the Lake. The road has since been thoroughly completed. The woods in this part of the road had escaped the general conflagration, and it was pleasant to meet with green foliage again after so many miles of blackened stumps. Tamarac, spruce, balsam, poplars, birch, and pines prevailed, and a thick undergrowth of hazel, cherry, gooseberries, currants, raspberries, wild onions, &c., everywhere abounded. Many fertile tracks along the road had been partially cleared and occupied by "squatters," and good crops of vegetables and maize were produced.

Thunder Bay Road.

Dam-site.

McNeill's Landing.

Embarkation of leading detachment.

On the 16th July, a sufficient number of boats and stores having been at length got ready, the first detachment of the expedition embarked; the masts of the boats not having arrived, substitutes were cut from young fir or poplar trees by the soldiers.

Order of departure, and medical arrangements for detachments of boats.

The following is the order of starting of the different detachments of the Force as arranged, one to start daily until all had departed, with the names of the Medical Officers :—

| Day. | Composition of Detachment. | Officer Commanding. | Medical Officer or otherwise. |
|---|---|---|---|
| 1 | 2 Cos. 1st Bn. 60th Rifles, Detachment R.A. and R.E. | Colonel Fielden, 60th Rifles... | Surgeon Young, P.M.O. |
| 2 | 2 Cos 1st Bn. 60th Rifles Detach. A.H. and A.S. Corps | ... ... ... ... ... | Assist.-Surgeon Oliver, 60th. |
| 3 | 1 Co. 1st Bn. 60th Rifles | Lieut.-Col. Bolton, D.A.A.G. | Hospital Serjeant, 60th. |
| 4 | 2 Cos. 1st Bn. 60th Rifles | ... ... ... ... ... | Assistant-Surgeon Shaw, R.A. |
| 5 | 2 Cos. 1st Bn. Volunteers... | ... ... ... ... ... | Hosp.-Serjeant Campbell, M.D. |
| 6 | 1 ,, ,, ,, ... | ... ... ... ... ... | Serjeant Hirchman, M.D. |
| 7 | 2 ,, ,, ,, ... | ... ... ... ... ... | Private W. F. Walker, M.D. |
| 8 | 2 ,, ,, ,, ... | Lt.-Col. Jarvis, 1st Bn. Vol.. | Surgeon Codd, 1st Bn. Volun. |
| 9 | 1 Co. 2nd Bn. Volunteers... | ... ... ... ... ... | Private Blisdell, M.D. |
| 10 | 2 ,, ,, ,, ... | ... ... ... ... ... | Staff Assist.-Surg. Chatterton, |
| 11 | 1 ,, ,, ,, ... | ... ... ... ... ... | Serj. Baglow, Hospital Steward. |
| 12 | 1 ,, ,, ,, ... | ... ... ... ... ... | Hosp. Serj., 2nd Bn. Volunteers. |
| 13 | 1 ,, ,, ,, ... | Lt.-Col. Casault, 2nd Bn. Vol. | Surgeon Neilson ,, ,, |

Medical arrangements for detachments of boats

It will be seen from the foregoing List that the strength of Medical Officers was insufficient to provide one to each detachment. Fortunately, in the ranks of the volunteers there were several legally qualified medical men who were willing to act as such. The Hospital Serjeants and one Hospital Steward, having a certain knowledge of the use of drugs and of performing minor surgical operations, were put in charge of certain detachments, and it was arranged that no detachment without a Medical Officer should be far ahead of one with one, so that in the event of serious accident or sickness that detachment might remain to be overtaken by the succeeding one. In one or two instances Colonel Wolseley changed the above programme slightly, after my departure, by dividing a detachment into two, but this principle was adhered to, and a supply of medicines and medical comforts accompanied all.

I made the following distribution of medical appliances:—Each Medical Officer in charge of a battalion, including myself, was provided with 2 field panniers and 1 field companion; the other Medical Officers, includ ng the Volunteers who acted as such and the Hospital Serjeants had each 1 field companion, and to the detachments without either a packet containing a few requisite medicines, diarrhœa mixture, lint, tourniquet, adhesive plaster, &c., was distributed. I also furnished to each detachment a written code of directions for the resuscitation of drowning men.

With each detachment were also supplied the following medical comforts:—

2 bottles brandy.
2 lbs. arrowroot.
4 tins essence of beef.
½ lb. sugar.
¼ lb. salt.
A small quantity of alum for the purification of water.
A bottle containing bitartrate of potass, as a refrigerant and antiscorbutic.

(*Note.*—On the return journey the quantity of essence of beef was increased to 12 tins, and 1 lb. of mustard, for sinapisms added.)

Departure of Staff.

Colonel Wolseley travelled independently in a canoe, in company with the Assistant Controller, in order to be able to communicate with the different parties on the road, and did not start until the greater number of the detachments had departed. The two Aides-de-Camp travelled in the Commanding Officer's gig. The Deputy Assistant Adjutant-General commanded the 3rd detachment of boats, and Lieut.-Colonel McNeill brought up the rear in a canoe, after seeing all the necessary arrangements carried out at the port of departure.

Detachment at Prince Arthur's Landing.

One company of Volunteers remained as a guard at Prince Arthur's Landing.

Maps. Route.

The accompanying Sketch Map will give a good general idea of the route travelled. It is to be remarked that all the maps supplied to the officers of the expedition were very incorrect; in that which I received the Lake Shebandowan, our point of departure, does not even appear. The whole route is but imperfectly explored, and only the exact line that is usually followed by canoes is at all accurately known; any deviation from this and the best maps as yet made are at fault. Guides were provided as far as practicable, but they frequently went astray, and professed guides could not always be met with. Colonel Wolseley having perceived, after proceeding through a portion of the journey that several of the detachments had lost their way went on ahead and "blazed" the road, that is, he removed a portion of the bark from certain trees in prominent positions on islands, promontories, &c., so that for the future such inconveniences rarely occurred. On the return journey, however, the "blazes" being intended for those going were not so useful, the path having to be selected first, and the continued absence of these marks being noticed on looking back alone showed that a deviation from the track had been made. Many instances of losing the way occurred for a time, while returning, but most of the officers had taken notes of the course and of prominent objects, and with the aid of these, with maps, and the recollection of the voyageurs or men, they soon recovered the lost track. I remarked that the Indian voyageurs, who are said by some of their admirers to have a wonderful instinct in recollecting a road once travelled, were as frequently at fault as the rest.

Detachments of boats.

The detachments of boats were divided into brigades, each brigade consisting of one company for the most part, and each boat contained a full supply of provisions for about 62 days, so that in the event of a boat being separated from its companion it would be fully victualled.

Brigades of boats.

The following Table of the dimensions and contents of the brigade to which I was attached will give a general idea of all :—

DIMENSIONS and Contents of one Brigade (Captain Ward's) of Six Boats.

| Number of Boat. | Dimensions and Officer in Charge. | | | | Style of Build. | Contents. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Length. | Breadth. | Depth. | Name of Officer. | | Pork. | Biscuit. | Flour. | Sugar. | Beans. | Preserved Potatoes. | Tea. | Pepper. | Ammunition. | Arm Chests. | Number of Men. | | |
| | | | | | | | | | | | | | | | | Officers. | N. C. O. and Privates. | Voyageurs. |
| | Ft. in. | Ft. in. | Ft. in. | | | Barrels. | Barrels. | Barrels. | Barrels. | Bags | Boxes. | Chests.* | Tins. | Boxes.† | No. | | | |
| 1 | 30 0 | 6 3 | 2 7 | Capt. Ward .. | Carvel | 7 | 6 | 6 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 8 | 2 |
| 2 | 32 0 | 6 7 | 2 6 | Serj. Hancock .. | Clinker | 7 | 5 | 6 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | .. | 8 | 2 |
| 3 | 25 0 | 6 5 | 2 0 | Lieut. St. Maur.. | „ | 6 | 3 | 4 | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 8 | 2 |
| 4 | 25 0 | 6 9 | 2 8 | Serj. Matthews.. | „ | 8 | 4 | 4 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | .. | 8 | 2 |
| 5 | 35 0 | 6 10 | 3 0 | Dr. Young .. | „ | 8 | 6 | 6 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 9 | 2 |
| 6 | 30 0 | 6 6 | 2 6 | Lieut. Wood .. | Carvel | 8 | 4 | 5 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 8 | 2 |
| | | | | | Total .. | 44 | 28 | 31 | 6 | 10 | 8 | 6 | 8 | 12 | 6 | 4 | 49 | 12 |

* In three Tins.

† 500 rounds in each.

Contents.

Brigade of boats. Contents.

In addition to the stores above enumerated each boat carried the personal equipment of every officer and man forming its crew, with tents in the proportion of 1 to 10 men, besides the following tools and equipment:—1 felling axe, 1 pickaxe, 1 spade, 1 shovel, 2 hand axes, 2 Flanders kettles, 2 frying pans, 2 masts, 2 sails, 2 boat hooks, 8 or 10 oars, besides dipper, bucket, spare rowlocks, paint, &c., a painter and 80 yards of tow line, and a can of mosquito oil. With each brigade there was also a tool-chest for repairing damages, and a fishing-net. In the boats carrying a Surgeon, there were, in addition, 2 field panniers, 1 field companion, and 1 box of medical comforts.

The weights of the principal articles above enumerated were as follows:—

1 barrel pork, 198 lbs.
1 „ biscuit, 110 lbs.
1 „ flour 120 lbs.
1 „ sugar, from 100 lbs. to 140 lbs.
1 chest tea, 54 lbs.
1 bag beans, 100 lbs. (12 gallons).
1 box preserved potatoes, 77 lbs.
1 „ ammunition (500 rounds), 70 lbs.
1 arm chest, about 200 lbs.

(The above weights include the weight of the barrel, box, or chest.)

*Personal Equipment.*

| | | |
|---|---|---|
| 1 Officer's baggage, including bedding ... .... ... | | 90 lbs. |
| 1 Soldiers' knapsacks, with contents, viz., mess tin, case, and strap; 1 pair trowsers, 1 pair ox-hide boots, 2 flannel shirts, 1 cholera belt, 1 bandage, 1 clasp knife, 1 fork, 1 spoon, 1 hold-all, 1 mosquito-net, 1 brush, 1 box blacking, 1 jet tin, 1 great coat and straps, tobacco 2 lbs., soap 1½ lbs., 1 tin dish and pannikin, 1 havresac, 1 woollen cap | 29 lbs. | |
| 2 Soldier's blankets and 1 waterproof sheet... | 10½ lbs. | |
| 1 Soldier's pouch, pouch-belt, frog, waist-belt, and 69 rounds of ammunition .... | 10 lbs. | |
| | | 49½ lbs. |

The average contents of the boats, including weight of masts, oars, sails, &c., may have weighed about 2 tons, and including the crew about 2¼ tons.

Geological description of route.

The tract of country through which the expedition passed was composed for the most part of rocks more or less crystalline; a portion of the broad belt of rugged Laurentian formation which bounds Lower Canada to the north, and which is continued westward across the Lake of the Woods to Lake Winnipeg. Granite and gneiss abound, with dome-shaped islands and rounded promontories. The whole of Rainy River, the south-west of the Lake of the Woods, and the whole Red River district are in a more recent formation, the Silurian, consequently these portions of the track are for the most part extremely fertile, and contrast in a marked manner with the generally rocky and sterile districts of the former.

Lake Shebandowan.

Lake Shebandowan, the first of the lakes traversed by the expedition, is about 20 miles in length from about W. to E., and is some 2 miles in greatest breadth; it is about 810 feet above the level of Lake Superior and 1,410 feet above the sea. It abounds in granite ranges, and for the greater part of its extent has a bleak appearance, its forests having been burnt in many places, and nothing but leafless trunks remaining. Its many islands, however, have growing trees, principally firs and birch, and portions of it are very picturesque. It terminates at its western extremity in a narrow rocky rapid stream containing several chutes by which the waters of the next lake (Lake Kashaboiwe) are poured into it. Between these two lakes the Kashaboiwe portage of some three-quarters of a mile had to be made. This was done by the leading division, assisted by a party of Mr. Dawson's engineers, in about 1½ day, through thick wood, over a pretty level ground, and the Kashaboiwe Lake was reached. This is a pretty lake, 839 feet above Lake Superior, with bold granite

Kashaboiwe Portage.

Kashaboiwe Lake.

shores and islands, and very numerous deep bays, at the termination of one of which, at a distance of about 9 miles from the last portage a little muddy creek, some 200 yards long, leads from Summit Pond (844 above Lake Superior), the highest water in this water shed. "Height of Land portage" was here made in a nearly northerly direction, through a fir forest about a mile in length, over the dividing ridge which separates the two water-sheds, to the next lake in our course (Lac des Mille Lacs). Hitherto our course had been *up* stream on waters discharging themselves into Lake Superior; henceforth, as far as Lake Winnipeg our course was to be *down* stream on affluents to that lake, and finally into Hudson's Bay.

Summit Pond.

Height of Land Portage.

Lac des Mille Lacs is a magnificent sheet of water, extending more than 30 miles in length, with a varying breadth of from half a mile to 12 miles or more. It is studded with countless numbers of dome-shaped granite islands, all covered with firs, poplars, birch, and thick underwood; the scenery often grand, with bold headlands principally of granite, covered with moss and *tripe de roche*. It is about 830 feet above the level of Lake Superior (1,430 feet above the sea). Our course led us through about 20 miles of it, at first westerly and a little north, then about S.W. to a narrow neck of land which apparently cuts off communication with the next lake in the neighbourhood. Here the "Baril portage" was made across a neck of land, rising abruptly to about 75 feet, and sinking in the same manner at the opposite side. The ground is here exceedingly rough with granite projections, and everywhere encumbered with tangled underwood, roots of trees, with apparently little or no soil for their support, and with difficulty could level spots for the tents be found. The portage road ran nearly due S. about 274 yards to the next lake (Baril Lake), which is smaller than the preceding ones, being about 8½ miles long, from 1 to 2 miles wide, our course being about W. by S., its shores very rocky and steep, with forests of firs, cedars, pines, and poplars to the next portage ("Brulé"), so named from a former conflagration, of which traces still remain in large pine stumps blackened by fire. A narrow shallow stream, rocky and turbulent, with a steep chute, connects the last lake with the next one in our course. The portage road here passes up a steep rock, then winds downwards through a ravine into the narrow stream above mentioned, through thick woods of pine, fir, poplar, hazel, &c., of luxuriant growth, and is about 462 yards long. Our track then passed through a little narrow creek, very shallow and abounding in reeds, then into Windigoostigan Lake, a succession of small lakelets with shores covered with cedars, firs, and poplars, with narrow reed-covered channels between. A small chute here obliged the men to disembark, and let the boats down with ropes. The course then passes through French River, a narrow and occasionally very shallow rocky stream, abounding in willows, reeds, and water-lilies, with cedars and firs beyond, where in several places the men had to disembark and tow the boats, at others to wade and guide the boats carefully among the rocks. At about 12 miles from the last portage the "Great French portage" is reached. This is usually about 2 miles in length, but by carrying the boats across a different route into the lower part of the French River below a waterfall which obstructs its course, this long portage is much diminished at the expense of a long tedious water-journey of 10 or 12 miles down the river, which is now diminished to a mere creek. Portage road thus made extends about 600 yards from the edge of the falls, down a steep descent, through cedars and dense underwood, into the creek, which is overgrown with reeds, willows, cornel, hazel, water-lilies, &c., and obstructed with logs, fallen trees, &c., causing much labour to surmount. This creek leads into French Lake, a sheet of water some 2 or 3 miles long, by about a mile wide, with bold cliffs and fine pine, fir, and aspen woods, which opens into another creek somewhat similar to tht last, but wider, less shallow, and only about 1½ mile long, where it expands into Lake Kaogasikok (or Pickerel), about 8½ miles in length in a S.W. direction, and varying from half a mile to 2 miles or more in width; towards the W. extremity several large rocky dome-shaped islands are passed, as usual covered with dense woods; it diminishes in width at its termination at the S.W. extremity, where a neck of land separates it from the next lake. This portage ("Pine portage") is about 572 yards long, the road rising in the centre about 45 feet; it terminates at Lake Doré, about 1½ mile across, where another portage ("Deux Rivières portage")

Lac des Mille Lacs.

Baril Portage.

Baril Lake.

Brulé Portage.

Creek.

Windigoos gan Lake.

French River.

French Portage.

French Creek.

French Lake.

Lake Kaogasikok.

Pine Portage.

Deux Rivières Portage. had to be made. This was one of the most difficult of all the roads to construct, the ground being very rough, at first rising steeply, then descending some 130 feet into a deep rocky ravine, crossing one or two brooks, then again rising 60 or 70 feet. Some magnificent pine-trees, more than 100 feet in height, were here growing; and we were forced to fell one of the largest in order to bridge the ravine to form our portage road. Here the skill of some of our Iroquois voyageurs in overcoming the difficulties in our way was very apparent, as well as the industry and perseverance of our soldiers. This work occupied us about

Lakelet. a day and a half. Our route then lay through a small lakelet, some quarter of

Creek. a mile across, through a long winding creek in a marshy country, covered with equisetum and water-lilies, the banks overgrown with willows, alder,

Sturgeon Lake. cornel, epilobium, &c., for about 1½ mile, when we emerged into Sturgeon Lake. This lake, at first marshy and reedy, gradually deepened, and assumed a bold picturesque appearance, having bold headlands of granite and gneiss. Our course led us through a wide expanse of lake, with bold rocky cliffs of hornblende schist, granite, and syenite, then among numerous picturesque islands, winding in and out among them in a tortuous course for about 16 miles, when our course was obstructed at the S.W. end of the lake by an impetuous rapid

Maligne River. current at the entrance of the Maligne River. Here the boats were taken down

Rapids. the rapids by Iroquois, all the crew having disembarked, with the exception of four rowers. Several of the boats received damage at this rapid. About 200 yards farther on a second rapid entailed the unloading of the boats, which were again manned by Indians. Four more rapids were "run" in the next

Tanner's Lake. 5 miles, with the assistance of the Indians. A small lake (Tanner's Lake) of about 2½ miles was crossed, when another strong rapid (Tanner's) again required

Tanner's Rapid. the boats to be unloaded. The river shallow, its course impeded by islands and sunken rocks, making navigation dangerous; banks very rocky, of dark schistose stone, covered with birch, firs, and poplars, with a general course W.S.W. Another rapid near the next portage terminated the dangers of the

Island Portage. river. This portage (Island Portage) crosses an island in the centre of the

River. stream, with a picturesque waterfall on each side of it. The portage road of 44 yards was soon completed, and the boats embarked in the river beyond, which, after about 3 miles of difficult navigation in consequence of numerous

Lake la Croix. sunken rocks, terminated in Lake la Croix. This lake abounds in islands and bold rocky headlands, covered as usual with dense forests; navigation intricate through the channels between the islands. After traversing about 20 miles of its extent, at first in a westerly, afterwards in a southerly direction, it termi-

Lake la Croix Portage. nated at La Croix Portage, which passes along the dried bed of a stream, over very rugged granite rock, for 211 yards. Hence a small creek runs into Loon

Loon Lake. Lake, a very irregular piece of water, made up almost entirely of deep bays, with high hilly rocky banks covered with trees. At the end of one of these

Loon Lake Portage. bays, at the S.W. extremity, Loon Lake Portage is reached, about 5 miles from the last. This is about 400 yards long, and the vegetation was so thick that after one of the tents was pitched it was discovered that it enclosed among the brushwood a coffin containing the corpse of an Indian child. The course then

Creek. passed along a creek full of equisetum, water-lilies, &c., for about three-quarters

Portage. of a mile, when a narrow rapid full of rocks compelled another portage of 40 yards. The creek then continued through shores covered with willows,

Nameukan Lake. alders, hazel, &c., for 3 or 4 miles, when it terminated in Nameukan Lake, of very irregular shape, with bold shores, and studded with numerous picturesque islands. Our course traversed about 17 miles of this lake, which terminated in

Creek. a creek. A large boulder obstructing the water entailed here a portage of

Portage. 60 yards, and about a quarter of a mile further on, a rapid and chute occurring,

Bare Portage. another portage (Bare Portage) of 242 yards, over very rough granite rocks, with thick vegetation. A few hundred yards farther through a narrow creek,

Rainy Lake. then past several islands formed of a black schistose rock, led us into Rainy Lake. This lake is more than 50 miles long, by about 40 in breadth; it is stated to be nearly 600 feet above the level of Lake Superior. Its shores are very rocky, abounding in rocks of granite, gneiss, mica schist, and chloritic schist. It is covered with forests of fir, poplar, and birch, but generally rather stunted. Numerous rocky islands prevail, covered with similar growth, and abounding in blueberries (*Vaccinium Canadense*), the pretty red berries known as "partridge berries" (*Gaultheria procumbens*), and a kind of "winter green"

(*Trientalis*). In several of the islands I found the sumach plant (*Rhus typhina*), and in one I was shown what was called "poisonous ivy." I was anxious to see this plant, having heard marvellous stories of the evil effects produced by handling it, inflammation, erysipelas, and even death having been said to be caused by it. The plant shown to me was not an *ivy*, however, but appeared to be a species of *Rhus* (*R. toxicodendron ?*). It was a low climbing plant, having a leaf composed of three leaflets. *I* certainly handled it with impunity, but an officer of the Volunteers showed me his feet immensely swollen and almost erysipelatous, which he attributed to walking after bathing barefoot on this "ivy." The evidence in the case was, however, very inconclusive, as he had not seen the plant, and I think exposure to the hot sun after bathing might have produced the effect. Certainly none of the men suffered from these effects.

Fort Francis. Rainy River. Chaudière Falls.

At a distance of about 46 miles from the last portage, Fort Francis, near the head waters of Rainy River, was reached. It is situated on high ground on the right bank of the river, overlooking the fine Chaudière Falls, which have a descent of about 23 feet. It is a station of the Hudson's Bay Company, and consists of a stockade enclosure containing several wooden buildings. A small farm is attached. Here there is frequently an Indian encampment, and corpses of several "braves" were suspended in the air by poles to dry, which had an unpleasant effect upon the organ of smell. The soil appears very rich, and wild flowers, roses, hawthorns, raspberries, &c., abound. A field hospital was established here under the charge of Assistant-Surgeon Shaw, R.A.; but the health of the men was so excellent that not a single case of sickness required admission into it. The medical supplies were subsequently forwarded to Fort Garry for the use of the Volunteers remaining there.

Chaudière Falls Portage. Manitou Rapid. Long Rapid. Lake of the Woods.

A portage of about 200 yards here was found, and the expedition proceeded on its way down the Rainy River, a very fine stream from 200 to 300 yards in width, with an average current of about 2 miles an hour. Its general course is a little N. of W., but it makes frequent windings in its career of about 80 miles. About 34 miles below the Chaudière Falls at Fort Francis are two small rapids—the "Manitou," with a fall of 3 feet, and the "Long Rapid," with a fall of 2½ feet. Below this, its course is unimpeded. It is the boundary line between the United States and Canada. It is of Silurian formation, and contains throughout its course a very rich alluvial soil, generally a sandy loam resting on clay. Its banks are covered with a very rich vegetation. Elms, ash, balsam, basswood (*Tilea Americana*), poplar, and oak abound; and cherries, wild plums, hazel, wild vine, roses, hawthorns, wild artichokes, convolvulus, vetches of numerous kinds, &c., are plentiful. It terminates in the Lake of the Woods. This extensive lake, which is calculated to be more than 70 miles long, by about the same width, is rather shallow at the mouth of the river, and numerous sand-banks and sandy islands obstruct the navigation. Farther on it resembles the scenery of the other lakes passed through. Some of the islands are susceptible of cultivation, and maize has been grown in them; but for the most part the coasts are rocky, consisting of mica schist, chloritic schist, granite, greenstone, &c. Many of the islands are very picturesque. Our course lay among them in order to procure shelter as much as possible from the heavy sea which a strong wind occasionally induces. A distance of about 64 miles brought us to Rat Portage, near which we were met by five Hudson's Bay barges containing some gentlemen from Fort Garry, with numerous Indian guides. Under the guidance of the latter, the remainder of the journey, down the river Winnipeg, was made.

Rat Portage. River Winnipeg. Portage. Les Dalles Rapids.

The river Winnipeg—a magnificent collection of lakes with communicating channels, occasionally 8 or 10 miles wide, at other times the channel we pursued being so narrow as barely to allow space for the oars, with hundreds of islands and rapids, with very numerous fine cascades—is a wonderful body of water, but full of dangers to the navigator. The first rapid passed was by a portage of 140 yards, about 4 miles from Rat Portage. About 12 miles of pretty strong current, through bold rugged islands covered with poplars and pines, brought us to the Dalles Rapids in a channel about 50 yards wide, between high rocky banks, which the boats "ran," under the guidance of the Indians. About 18 miles further of rapid current, through a tortuous course among islands and a narrow rapid channel some 20 yards wide, obliged a portion of the crew

Grande Décharge.

to disembark while the boats were steered down the rapids (Grande Décharge) by our Indian guides. About 2 miles farther of rapid current, and one or two rapids, the Yellow Mud Falls are reached, where there is a descent of about 22 feet over granite rocks; this entailed a portage of 110 yards. A few yards below this a small chute is "run" with a portion of the crew only. Pine Portage follows at about half a mile below the last, the river having narrowed to about 6 yards, and a rapid and chute occurring; this portage is about 240 yards long. Another 100 yards brought us to the 1st Cave Rapids, which were "run," half the crew having been landed; and about half a mile further on the 2nd Cave Rapids, which were also "run." The river is here only about 22 yards wide, between high perpendicular rocks. For some 17 miles the course of the river is pretty free from current. In the interval, at a bend in the channel, the Islington Mission, a clearing and farm, is passed. The width of the river is here about 300 yards, and it soon expanded to the size of a lake, appearing more than half a mile wide, with deep bays and bold promontories and numerous islands; banks covered with young poplars. The boats were let down the De l'Isle Rapids by means of a rope, the crews having disembarked. For the next 21 miles the river channel varied in width from about a mile to only 70 yards, the course being through islands and past numerous promontories. The granite rocks here assume a reddish tinge. The Chute à Jacquot falls (about 13 feet deep, about 170 yards wide, of crescentic shape) over reddish granite rocks, rising one over the other in the form of steps, caused a portage of 66 yards over the rocks. This fall very beautiful and grand. A small rapid immediately afterwards, and about 7½ miles of current, bring us to the Pointe des Bois Falls. A succession of three portages here occur, of 268, 110, and 66 yards respectively, in a length of river of about 1½ mile. The falls here are very beautiful. A rather strong current of nearly 4 miles leads to the Slave Falls, the river here about 500 yards wide, and with a nearly perpendicular fall of about 20 feet between high granite shores, succeeded by a strong rapid. A portage of 660 yards is here made; 5½ miles of current, through channels between islands, bring us to a rapid, where the stores were disembarked and portaged 200 yards, and the boats let down by a rope. On re-embarking they "shoot" the Barrière Chute, narrowly avoiding a whirlpool. The Otter Falls, a very violent rapid, some 200 yards wide, were "run" at about 7 miles from the preceding; and 6½ miles further on bring us to the succession of rapids and falls known by the name of the Seven Portages. They all occur in a space of about 2 miles, and their approach is very dangerous. Portages respectively 132, 110, 176, 60, and 700 yards (the last two being included in one). Here many of the boats received severe damage, and one or two required to be left behind. Fortunately no other casualty occurred. At the last of these portages the soil appeared more fertile than usual, and numerous cherry and plum trees, quantities of wild artichoke, rye grass, &c., in addition to poplars, aspens, and firs appeared. The river is pretty quiet for a distance of 10½ miles, when the Bonnet Lake is reached. It is about 6 miles across, and followed by a rather narrow channel with one or two rapids. Two small portages (Gala de Bonnet) here occur, respectively 25 and 88 yards long, over rocks; the boats dangerously near the falls. 4 miles further on are the Grand Bonnet Falls, a long portage of 1,122 yards, but generally level, followed by a current of about a mile, for the last 200 or 300 yards of which the boats are towed, as a precaution against being drawn over the falls of the Rocher de Bonnet; a portage here of about 132 yards over the rocks close to the falls. After 2 miles more, the White Mud Falls, with a portage of 330 yards, occurs. About 3 more miles of current, in a channel some 600 yards wide, lead to the two Silver Falls, made by us in one portage of 1,320 yards. Here the soil is very fertile: oaks, poplars, birches, pines, with quantities of plum and cherry trees, roses, hawthorns, &c., abound. Here too I saw the Labrador tea (*Ledum palustre*) and the Virginia creeper (*Ampelopsis hederacea*). The river is about 400 yards wide, and the succession of cascades over granite rocks forming the falls has a grand and imposing effect. 5 miles more of river bring us to the last of these portages (Pine Portage), 264 yards long, after which a course of about 6 miles, including one short rapid, brings us to Fort Alexander, where a short rest in camp awaited us, well earned after the incessant fatigues, from sunrise to sunset (every day the same), experienced since our departure.

Yellow Mud Falls Portage.

Chute.

Pine Portage.

1st Cave Rapids.

2nd Cave Rapids.

Islington Mission.

De l'Isle] Rapids.

Chute à Jacquot Portage.

1st Pointe des Bois Portage.

2nd Pointe des Bois Portage.

3rd Pointe des Bois Portage.

Slave Falls Portage.

Barrière Chute. Portage.

Otter Falls.

1st of Seven Portages.

2nd do. do.

3rd do. do.

4th do. do.

5th do. do.

6th and 7th of Seven Portages.

Bonnet Lake.

1st Gala de Bonnet Portage.

2nd do. do.

Grand Bonnet Portage.

Rocher de Bonnet Portage.

White Mud Falls Portage.

1st and 2nd Silver Falls Portage.

Pine Falls Portage.

Fort Alexander is another Hudson's Bay station, and, like the rest, consists of several houses, for the most part of wood, surrounded by a stockade. In addition there is a tall wooden watchtower. A productive farm and vegetable garden are attached to it. The soil appears to be a rich black mould over a whitish marly clay. Our camp was pleasantly situated on a grassy plain sloping towards the river, on its left bank, at about 2 miles from its mouth, with woods of aspens at the rear and east sides, and the buildings of the fort on the west. Fort Alexander.

The leading detachment arrived at Fort Alexander on the morning of the 18th August, the 2nd detachment in the afternoon of the same day; the other detachments of the 60th Rifles arrived all well, although with the loss of several boats, on the 19th and 20th. Colonel Wolseley and Staff arrived on the evening of the 20th.

The whole of the Regular troops left Fort Alexander on the afternoon of the 21st August, commanded by Colonel Wolseley, leaving the Volunteers to follow. The force consisted of 49 boats, accompanied by four large Hudson's Bay *bateaux*; and the wind being fair, and every boat hoisting the lug-sails, "wing and wing" (one sail on each tack), the little fleet had a most imposing appearance as it sailed down the river, between its rather low banks covered with aspen trees, into Lake Winnipeg. River Winnipeg.

Lake Winnipeg, 280 miles long by 57 miles in greatest breadth, is stated to be the boundary, from the mouth of the River Winnipeg near its south end to its north extremity, between the generally rugged Laurentian formation and the limestone of Silurian date. It is 628 feet above the sea (28 feet above level of Lake Superior), and 361 feet lower than the Lake of the Woods, the River Winnipeg having descended that distance in its boisterous course. It is generally rather shallow, especially towards its southern extremity, where there is a sandy bar formed by the wash of the Red River. Lake Winnipeg.

The little fleet entered the Red River by one of the four or five principal channels of the delta at its mouth on the 22nd August, between marshy shores covered with tall rank grass 6 or 7 feet high. The different brigades of boats proceeded up the river in due order. The country gradually became less marshy, and willows, then aspens, then elms made their appearance. Passed an Indian village on the left bank, where Henry Prince, a Chippewa chief, has sway, who had an interview with Colonel Wolseley, to display his loyalty and receive presents of pork and flour. He was dressed in coarse English shooting costume, but was accompanied by numerous "braves" covered with feathers and dirt. He made a very flowery speech, as appeared from the interpretation, in a pleasantly sounding, soft, and sonorous language. We passed a large Indian encampment, and then reached a line of settlers' clearings on each side of the river, which is dotted with neat wooden houses and small farms all the rest of our course, with a church here and there. The settlers—men, women, and children—turned out to welcome us with musket-shots and cheers, and the bells of the churches were set ringing. We reached Lower Fort Garry, on the left bank, on the 23rd August. It is situated on the summit of a high, nearly perpendicular clay bank, with limestone appearing at intervals. It is surrounded by a stone wall 7 feet high, with circular corner bastions: hence its common name of "Stone Fort." The houses within are clean and well built, and with some alterations will make good barracks and hospital for the 2nd Battalion Quebec Volunteers, who are to be quartered here. It is about 23 miles from (Upper) Fort Garry by river windings. Continuing our journey, we passed up a rather dangerous rapid some 8 miles on; after which, with the exception of rather a strong current for some 8 or 9 miles farther, there was no other obstacle to our ascent. The banks continued dotted with houses, churches, &c.; and the scenery was generally flat, the river banks being steep, clayey, covered with black mould; trees, few in number, principally aspens, elms, maple, ash, and oak. Landed about a mile from Fort Garry on the morning of the 24th, in a drizzling rain. The troops formed, sending out skirmishers; the little mountain guns were carried in a cart. On arriving at the fort we found the south entrance closed, and a large gun mounted over the gateway; other guns were perceived pointing towards us from the embrasures. We had no certain information as to the proceedings of the rebels, and expected to be opposed, but on proceeding to the opposite gateway it was found to be Red River. Lower Fort Garry (Stone Fort).

Fort Garry. open. We learned that Riel had endeavoured to persuade his men to fight up to the last, and that he had only fled half an hour before, leaving all his papers, &c., and his breakfast partly consumed, which we shortly made an end of. Formal possession was taken of the fort, the British colours hoisted, and a royal salute fired with some of the fort guns. We found all the buildings in a neglected, filthy condition; the walls, with which the fort is surrounded for half its extent, crumbling away.; the wells, receiving drainage, had become foul. The troops were encamped, and a survey made with a view of preparing rooms for barracks for the use of the 1st Battalion Ontario Volunteers, who are to be quartered there. With the alterations proposed, I believe the accommodation will be good. A building formerly used as a jail appeared to me suitable for a hospital, with a few necessary alterations, which were ordered; it is immediately outside the fort.

Fort Garry, situated at the junction of the Assiniboine and Red Rivers (lat. 49° 52′ N., long. 96° 53′ W.; at an elevation of 680 feet above the sea), was built in 1845. It appears to have been originally enclosed with a stone wall, having circular stone bastions at the corners; but when an addition to its extent was made, the new portion of the enclosure was surrounded by a stockade. It is on the edge of the extensive prairie which stretches north and south from the Arctic Ocean to the Gulf of Mexico, with occasional interruptions.

Red River Settlement. The Red River Settlement at present extends about 20 miles above Fort Garry, and 30 miles below it on the Red River, and about 70 miles up the Assiniboine. The soil is very fertile, and according to Professor Hind consists of 10 to 20 inches of black mould on a thick bed of alluvial clay. This fertile land is said to extend for about 4 to 30 miles east, and about 40 miles west of the river. It is in parts swampy, but is said to be capable of being drained. It is also in places subject to inundations, and in some years the crops are much damaged by the ravages of grasshoppers.

Town of Winnipeg. The town of Winnipeg, a mere collection of wooden huts, with a few good shops or "stores," is about a mile from the fort, by a road which we found ankle-deep in mud and adhesive clay, and abounds in drunkards, judging from our few days' experience. Indians and white-faces were constantly to be seen in every stage of intoxication.

Red River. Red River, in its winding course, is stated to be nearly 600 miles long; it crosses the United States' boundary a little over 100 miles from its mouth; it

River Assiniboine. is from 200 to 500 feet wide, and about 40 miles from its mouth receives its tributary, the Assiniboine, which latter river has a winding course of more than 600 miles. It is about 230 feet wide at Fort Garry.

Climate. The extremes of heat and cold in the settlement are very great. Bishop Taché states that for "whole months there is a mean temperature of 22° Fahr. in the mornings, while at mid-day in summer there is a mean of 86° Fahr." Professor Hind states that the mean temperature of the seven warm months (April to October) at Fort Garry is 57·58°, that of Quebec for the same period being 55·45°; and the mean temperature of the remaining cold months (November to March) at Fort Garry is 1·94°, and at Quebec 20·68°. Snow never falls so deeply as in Canada, and, being very dry and powdery, cattle are able to find

Productiveness. food below it by thrusting their noses in it. The productiveness of the settlement is great. Sir John Richardson says that wheat is sown early in May and reaped at the end of August, and that the returns vary from 30 to 40 fold, or bushels to the acre; and Professor Hind mentions a settler who had obtained 56 bushels of wheat to the acre, simply by judicious ploughing.

Climate during journey. During the journey I found it impossible to take accurate observations in a crowded boat, and can only state that the highest registry I saw by my thermometer was 94° in the shade, and only once was it so low as the freezing point. Generally the days were hot, sometimes oppressively so, and the nights cold on the outward journey; on our return in September the days were less hot, and the nights warm. We were generally fortunate, as regards rain, after leaving Thunder Bay Road, although we had several violent thunder-storms, and occasionally heavy rain. The latter was seldom of long duration, and it so happened that at the hour of tent-pitching it was fine, so that the men generally contrived to keep their bedding dry, and to have a change of dry clothing.

The object of the expedition having been obtained, and the whole force having arrived, or being known to be near (the Volunteers having completed their journey in about the same number of days as the Regulars, and with the same wonderful freedom from casualty by accident or disease), the return journey was commenced. Detachments started on their return daily between the 29th August and the 3rd September. One company of Volunteers having arrived by the north-west angle of the Lake of the Woods, whence a road is proposed to be made to Fort Garry, one company of the 60th returned that way, taking on the boats of the former. The route was about 110 miles long, of which about 70 were practicable for carts; the remainder was very difficult, over swamps and prostrate trees. Pack-horses conveyed the baggage, which required to be constantly removed and carried by the men, and re-adjusted to the horses. Men are now engaged in making a road this way to avoid the dangers of the Winnipeg River, and to shorten the journey by about 160 miles. The remaining detachments followed the same route on their return as in going. The same portages were made, and, in addition, many others; for rapids which were previously "run" required the boats to be towed, and the baggage (often the boats also) to be portaged. This labour was however easier upon the men, as a much smaller supply of provisions was carried in each boat, and the crews of each were increased in number: thus each man had less to carry, and the reliefs at the oars were more frequent. We met with fine weather for the most part, and the journey was accomplished without sickness or casualty among the men; but several boats were completely destroyed, and many more or less injured. On arriving at Thunder Bay Road we found a marked change; it was completed the whole way, and was generally very good. However, the effects of a succession of bad weather with heavy traffic have yet to be proved.

Return journey.

Overland route to north-west angle of Lake of the Woods.

The whole of the Regular Troops reached their destination (Montreal) in good health and spirits, without a sick man, by two steamers, arriving respectively on the 5th and 12th October.

The following Table shows a rough estimate of the different distances travelled by road and water. Mr. Dawson's distances are *generally* followed, but complete accuracy is impossible to be obtained:—

Table of distances.

PRELIMINARY ROUTE.

| | Miles. |
|---|---|
| Railway, Toronto to Collingwood .. .. .. .. | 94 |
| Steamboat, Collingwood to Prince Arthur's Landing .. | 534 |
| Total .. .. .. .. .. | 628 |

REMAINDER OF ROUTE.

| | Distances. | | Remarks. |
|---|---|---|---|
| | Miles. | Chains. | |
| Thunder Bay Road .. .. .. | 48 | 00 | |
| Shebandowan Lake .. .. .. | 20 | 00 | |
| Kashaboiwe Portage .. .. .. | 0 | 60 | |
| Kashaboiwe Lake .. .. .. | 9 | 00 | A small portage here on returning. |
| Height of Land Portage .. .. | 0 | 77 | |
| Lac des Mille Lacs .. .. .. | 20 | 00 | |
| Baril Portage .. .. .. .. | 0 | 17 | |
| Baril Lake .. .. .. .. | 9 | 00 | |
| Brulé Portage .. .. .. .. | 0 | 21 | |
| Windigoostigan Lake and part of French River .. .. | 12 | 00 | |
| French Portage .. .. .. | 0 | 27 | |
| French Creek, French Lake, and Lake Kaogasikok .. .. | 20 | 00 | |
| Pine Portage .. .. .. .. | 0 | 26 | |
| Lake Doré .. .. .. .. | 1 | 60 | |
| Deux Rivières Portage .. .. | 0 | 32 | |
| Lakelet, creek, and Sturgeon Lake .. | 18 | 00 | |

REMAINDER OF ROUTE—*cont.*

| | Distances. | | Remarks. |
|---|---|---|---|
| | Miles. | Chains. | |
| Maligne River:— | | | |
| Rapid and current | 0 | 26 | Portage on return journey. |
| Portage | 0 | 03 | |
| Rapids and current | 5 | 11 | Portage partially on returning. |
| Tanner's Lake | 2 | 30 | |
| Tanner's Rapid, portage | 0 | 05 | |
| Current and rapid | 4 | 51 | |
| Island Portage | 0 | 02 | |
| River | 2 | 65 | |
| Lake la Croix | 20 | 00 | |
| Lake la Croix Portage | 0 | 10 | |
| Loon Lake | 5 | 00 | |
| Loon Lake Portage | 0 | 18 | |
| Creek | 0 | 60 | |
| Portage | 0 | 02 | |
| Creek | 4 | 00 | |
| Nameukan Lake and Creek | 17 | 00 | |
| Portage | 0 | 03 | |
| Creek | 0 | 20 | |
| Bare Portage | 0 | 11 | |
| Rainy Lake | 44 | 00 | |
| Rainy River:— | | | |
| Current and rapid | 2 | 03 | |
| Chaudière Falls, Fort Francis, portage | 0 | 10 | |
| Current | 34 | 00 | |
| Manitou Rapid | 0 | 03 | |
| Current | 7 | 40 | |
| Long Rapid | 0 | 05 | |
| Current | 30 | 20 | |
| Stream | 6 | 00 | |
| Lake of the Woods to Rat Portage | 64 | 17 | |
| River Winnipeg:— | | | |
| Current | 4 | 00 | |
| Portage | 0 | 07 | |
| Current | 9 | 28 | |
| Dalles Rapid | 0 | 10 | |
| Current | 22 | 09 | |
| Grande Décharge | 0 | 30 | |
| Current rapid, &c. | 2 | 40 | |
| Yellow Mud Portage | 0 | 05 | |
| Current | 0 | 05 | |
| Chute | 0 | 04 | Partial portage returning. |
| Current | 0 | 31 | |
| Pine Portage | 0 | 10 | |
| Current | 0 | 05 | |
| 1st Cave Rapids | 0 | 03 | Ditto. |
| Current | 0 | 27 | |
| 2nd Cave Rapids | 0 | 01 | |
| Stream | 20 | 44 | |
| Portage de l'Isle | 0 | 20 | "Run" by means of a rope and boats towed on returning. |
| Current, rapid, &c. | 25 | 00 | |
| Chute à Jacquot Portage | 0 | 05 | |
| Rapid and current | 7 | 52 | |
| 1st Pointe des Bois Falls Portage | 0 | 13 | |
| Stream | 0 | 05 | |
| 2nd Pointe des Bois F s Portage | 0 | 05 | |
| Current | 1 | 16 | |
| 3rd Pointe des Bois Falls Portage | 0 | 03 | |
| Current | 3 | 66 | |
| Slave Falls Portage | 0 | 30 | |

REMAINDER OF ROUTE—*cont.*

| | Distances. | | Remarks. |
|---|---|---|---|
| | Miles. | Chains. | |
| River Winnipeg—*cont.* | | | |
| Current and rapid .. .. | 5 | 62 | |
| Barrière Chute Portage .. .. | 0 | 03 | |
| Rapids and current .. .. | 6 | 65 | |
| Otter Falls .. .. .. | 0 | 10 | "Run" going, portage returning. |
| Current and rapid .. .. | 6 | 70 | |
| 1st of Seven Portages .. .. | 0 | 06 | |
| Current .. .. .. .. | 0 | 05 | |
| 2nd of Seven Portages .. .. | 0 | 05 | |
| Current .. .. .. .. | 0 | 10 | |
| 3rd of Seven Portages .. .. | 0 | 08 | |
| Current .. .. .. .. | 0 | 40 | |
| 4th of Seven Portages .. .. | 0 | 03 | |
| Current .. .. .. .. | 0 | 48 | |
| 5th of Seven Portages .. .. | 0 | 04 | |
| Current .. .. .. .. | 0 | 06 | |
| 6th and 7th of Seven Portages (in one) .. .. | 0 | 32 | |
| Current .. .. .. .. | 10 | 44 | |
| Lac de Bonnet .. .. .. | 6 | 09 | |
| Rapids and current .. .. | 0 | 07 | |
| 1st Gala de Bonnet Portage .. | 0 | 01 | |
| Current .. .. .. .. | 0 | 54 | |
| 2nd Gala de Bonnet Portage .. | 0 | 04 | |
| Current .. .. .. .. | 3 | 51 | |
| Grand Bonnet Portage .. .. | 0 | 51 | |
| Current .. .. .. .. | 0 | 72 | |
| Rocher de Bonnet Portage .. | 0 | 06 | |
| Current .. .. .. .. | 2 | 02 | |
| White Mud Falls Portage .. | 0 | 15 | |
| Current .. .. .. .. | 2 | 68 | |
| 1st and 2nd Silver Falls Portage (in one) .. .. | 0 | 60 | |
| Rapids and current .. .. | 5 | 07 | |
| Pine Falls Portage .. .. | 0 | 12 | |
| Current .. .. .. .. | 1 | 34 | |
| Manitou Rapid .. .. .. | 0 | 02 | |
| Current to Fort Alexander .. | 4 | 28 | |
| Stream to Lake Winnipeg .. | 2 | 00 | |
| Lake Winnipeg to mouth of Red River | 44 | 98 | |
| Red River:— | | | |
| To Lower Fort Garry (Stone Fort) .. .. .. | 20 | 08 | |
| Current .. .. .. .. | 11 | 78 | |
| Rapid .. .. .. .. | 0 | 02 | |
| Current .. .. .. .. | 9 | 00 | |
| To Fort Garry .. .. .. | 2 | 00 | |
| Total .. .. .. | 662 | 79 | |

It is calculated that about 15,000 yards of portages were made each way. (NOTE.—We made latrines at all the principal portages). Note.

The arrangements of the Control Department were excellent, and the provisions supplied to the troops without exception of the best quality. As it appeared to me that in the published "Scale of Diet" there was an ambiguity in the expression that beans *or* preserved potatoes would be issued daily, which might mean that *either* might be furnished indifferently, I wrote officially on the subject, pointing out the fact that potatoes were known as a preservative from scorbutic affection, and that beans had no such effect, and strongly recom- Provisions.

mending that fresh potatoes when practicable, and preserved ones at other times, should be issued as frequently as possible. I believe that in consequence of my representation a much larger supply of preserved potatoes was procured than would otherwise have been the case, and during the whole expedition there was an abundant supply.

Preserved Potatoes.

Tea.

The amount of tea consumed was very great, and the allowance of 1 oz. per man daily was not excessive, the very arduous nature of the work, and the frequently extreme heat of the weather causing constant thirst, which was gratefully relieved by tea. The allowance of sugar, however, was too small in proportion.

Sugar.

Portable Bakehouse. Bread. Biscuit. Flour. Suggestion.

While encamped, a portable bakehouse was erected, and bread of excellent quality issued. The biscuit used during the journey was of good quality, but was frequently spoilt by wet, the casks in which it was packed not being waterproof. Flour was frequently substituted for it, being made into a kind of pancake cooked in a frying-pan with pork fat. It is suggested that in a future expedition, baking kettles and some preserved yeast or baking powder should be provided.

Salt Pork.

The pork was excellent, and the men generally liked it, but there was a small number (myself among them) who could never overcome their repugnance to it.

Beans.

The beans were of the kind known as "haricots blancs," very good when well cooked, but to do this a long process of steeping and boiling was required, and the time allowed was insufficient, unless they were cooked overnight, and the men were frequently too much fatigued after their day's work. They frequently also became spoiled by wet, and time could seldom be spared to lay them out in the sun to dry. Many of them consequently became so offensive that it was necessary to throw them away.

Provisions.

Suggestions.

I would suggest that in any future similar expedition, a more varied diet should be provided, and that preserved meat and compressed vegetables should form part of the ration. I found that a small private supply of pemmican for the return journey occupied little space, and was more agreeable to the palate than pork.

Fishing.

In all the boats fishing was nearly daily practised, the lines and spoon bait being provided by the officers, and often with considerable success, large numbers of pike and pickerel being occasionally caught.

No spirit ration.

It will be seen that no spirit ration was issued. Certainly, no men could have enjoyed better health than the troops, without it; but I do not think one instance sufficient as a precedent for all future expeditions, as the climate and weather of this one were exceptional.

Clothing.

Serge Clothes.

The serge clothing provided was very good, and well adapted to the work. It could not however stand the "wear and tear" throughout, and men supplemented the absence of portions of their nether garments by patches made of portion of bean-bags, occasionally a pair of trowsers made wholly of that material was improvised.

Waterproof Sheet.

A most useful article furnished to the men was a waterproof sheet. It kept their bodies from the wet ground at night, and preserved their bedding (2 blankets) dry in the daytime. It was intended to be used as a covering for themselves in wet weather, but it was more usefully employed as above. I agree with Assistant-Surgeon Oliver's remark, that a waterproof coat (or "sou'wester") would have been useful.

Blankets.

The blankets were rather thin, and in cold weather were insufficient. On the return journey, an extra blanket from the Hudson's Bay Stores of excellent quality was supplied.

Amount of sickness, &c.

As will be perceived by the accompanying Returns of Sick, the health of the men was unprecedently good. Many of the cases admitted into hospital were of a trifling nature; some were contracted before arrival, such as a few cases of venereal, one of incipient phthisis, one case of scarlatina among the officers, &c. A great amount of diarrhœa prevailed at different times owing to exposure to wet, but was nearly always immediately checked by remedies, the men generally continuing at their duty. A few cases of dysentery, attributable to the same causes, were treated in hospital, and one or two in the boats, but they appear to have been rather cases of dysenteric diarrhœa, being easily amenable

Causes of free-
om from
ickness.

Conclusion.

SKET
OF THE ROUT
BY TH
RED RIVER E
MAY_ OCTO
1870
NOTE.
Line of Route
Route of Kamanistiquia River
Proposed Route when Road from
to Port Garry is completed
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BER.

Wangle or Lake of the Woods

to treatment. Very numerous slight cases of incised wounds from unskilful use of the axe occurred, and a few required hospital treatment. A severe case of scalp wound occurred, treated in the boats, but rapidly recovered. A case of gunshot wound, caused by the accidental discharge of a revolver pistol occurred amongst the Volunteers. The Surgeon, who was with a different detachment a few miles in the rear, was sent for, who extracted the ball, which had passed through the chest. The man soon recovered. One case of pneumonia in a man of the 60th Rifles, succeeding delirium tremens after two days' hard drinking at Fort Garry, required to be left behind, in an almost hopeless state, in charge of the Volunteers. I have since heard that he is convalescent. The few cases of men invalided to Canada, as shown in the Returns, were men not likely to recover sufficiently to continue the journey, and in some cases apparently permanently unfit. However, none of these were diseases attributable to the effects of the expedition, so far as appeared.

Causes of freedom from sickness.

The extraordinary immunity from sickness in the Force may be attributed to several causes; first of all, and most important, the extremely careful manner in which the medical inspection of the troops was made before starting, and the rejection of all such who appeared either from natural delicacy of constitution or from recent hospital treatment unlikely to support the necessary fatigues; next, the constant excitement of change of scene, and the life in the open air, with plenty of work (perhaps too much) and good food, the absence of intemperance and of venereal excess. Another cause was, I believe, the constant presence of a Medical Officer, or in his absence of one to dispense the few necessary medicines, so that on the very first invasion of the prevailing complaint, diarrhœa, proper treatment was instantly adopted. Finally, the healthy climate.

Conclusion.

In conclusion, it is a subject of much congratulation that in so long and dangerous an expedition with men of inexperience, although many "hair-breadth" escapes happened, there was no casualty affecting life.

## REGULAR TROOPS.

RETURN of Sick treated in Field General Hospital, Thunder Bay, from 27th May to 26th September, 1870.

| | Class I. | | | II. | | | | | | | | | III. | V. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Order *b.* | | | 1 | 6 | 9 | | | 10 | 13 | 14 | | 1 | 2 | | |
| | Acute Rheumatism. | Chronic Rheumatism. | Primary Syphilis. | Dementia. | Inflammation of glands. | Dysentery. | Colic. | Hepatitis. | Gonorrhœa. | Abscess (cell. tissue). | Ulcer. | Carbuncle. | General Debility. | Wounds. | Total. | Stations. |
| Admitted ... 1st Battalion 60th Rifles | 5 | 1 | 2 | 1 | 1 | 1 | ... | 2 | 2 | 1 | 1 | 1 | 1 | 3 | 22 | From Toronto to Thunder Bay, leaving by detachments on 21st and 24th May, and arriving on 25th, 27th, and 31st May, and 1st June. |
| Admitted ... Royal Artillery ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| Admitted ... Royal Engineers ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| Admitted ... Army Hospital Corps ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| Admitted ... Army Service Corps ... | 1 | ... | ... | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | 2 | |
| Total admitted ... ... | 6 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 3 | 24 | In Camp, Thunder Bay, and on various detached duties along the 48 miles of road, employed road making, conveying boats and stores by river, &c., from date of arrival until departure from Lake Shebandowan. |
| Discharged 1st Battalion 60th Rifles | 5 | 1 | 2 | 1 | 1 | 1 | ... | 2 | 2 | 1 | 1 | 1 | 1 | 3 | 22 | From Lake Shebandowan by boats to Fort Garry, leaving by detachments on 16th, 17th, 18th, 19th, and 21st July, and arriving on 24th August. |
| Discharged Royal Artillery ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| Discharged Royal Engineers ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| Discharged Army Hospital Corps ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| Discharged Army Service Corps ... | 1 | ... | ... | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | 2 | |
| Total Discharged ... ... | 6 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 3 | 24 | Return journey by boats from Fort Garry, to Lake Shebandowan, by detachments, leaving on 29th, 30th, and 31st August, and 1st September, and arriving at various dates from 23rd September to 3rd Oct. |
| Total Died ... ... ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| Invalided to Canada ... 1st Battalion 60th Rifles | 2 | ... | ... | 1 | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | 4 | March to Thunder Bay, and journey by steamer thence, in 2 divisions to Montreal, arriving on 5th and 12th October. |
| Invalided to Canada ... Army Service Corps ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1 | |
| Total Invalided ... .. | 3 | ... | ... | 1 | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | 5 | |

Average Strength for the above period—

| | |
|---|---|
| 1st Battalion 60th Rifles ... ... ... ... | 355 |
| Royal Artillery ... ... ... ... ... | 19 |
| Royal Engineers ... ... ... ... ... | 19 |
| Army Hospital Corps ... ... ... ... ... | 7 |
| Army Service Corps ... ... ... ... ... | 12 |
| Total Average Strength ... ... ... | 412 |

Average Daily Sick in Hospital, calculated from the number of diets—

| | |
|---|---|
| 1st Battalion 60th Rifles ... ... ... ... | 2·44 |
| Royal Artillery ... ... ... ... ... | ... |
| Royal Engineers ... ... ... ... ... | ... |
| Army Hospital Corps ... ... ... ... | ... |
| Army Service Corps ... ... ... ... ... | 0·09 |
| Total Average Daily Sick ... ... ... | 2·53 |

E. W. YOUNG, M.D.,
*Surgeon-Major 60th Rifles, P.M.O.*

## REGULAR TROOPS.

### DISEASES of Men treated on Line of March, in Boats, &c., from 21st May to 31st October, 1870.

| Corps. | Class I. | II. | | | | | | V. | | | Total. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Order *b.* | 8 | 9 | | | | 10 | 2 | | | |
| | Acute Rheumatism. | Pneumonia. | Dysentery. | Diarrhœa. | Colic. | Obstruction of Bowels. | Gonorrhœa. | Contusion. | Wound of Scalp. | | |
| Admitted ... 1st Battalion 60th Rifles | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | ... | 10 |
| Admitted ... Royal Artillery | .. | ... | ... | 1 | ... | ... | ... | ... | ... | ... | 1 |
| Admitted ... Royal Engineers | .. | ... | ... | ... | ... | ... | ... | ... | 1 | ... | 1 |
| Admitted ... Army Hospital Corps | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Admitted ... Army Service Corps | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Total admitted | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 2 | ... | 12 |
| Discharged 1st Battalion 60th Rifles | 1 | ... | 1 | 2 | 1 | 1 | 1 | 1 | 1 | ... | 9 |
| Discharged Royal Artillery | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | 1 |
| Discharged Royal Engineers | ... | ... | ... | ... | ... | ... | ... | ... | 1 | ... | 1 |
| Discharged Army Hospital Corps | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Discharged Army Service Corps | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Total discharged | 1 | ... | 1 | 3 | 1 | 1 | 1 | 1 | 2 | ... | 11 |
| Total died... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Total remaining | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | 1* |

* Left at Fort Garry in charge of Volunteers (since convalescent).

Average daily Sick treated on line of march, in boats, &c., during the above period.

| | |
|---|---|
| 1st Battalion 60th Rifles | 0·41 |
| Royal Artillery | 0·01 |
| Royal Engineers | 0·16 |
| Other Corps | ... |
| Total average daily sick on line of march, &c. | 0·58 |

### RETURN of Sick Officers from 21st May to 31st October, 1870.

| Corps. | Class II. | | | | Total. |
|---|---|---|---|---|---|
| | Order *g.* | | | | |
| | Dysentery. | Diarrhœa. | | | |
| Admitted... 1st Battalion 60th Rifles | 2 | 1 | ... | ... | 3 |
| Admitted... †Royal Canadian ,, | 1 | ... | ... | ... | 1 |
| Admitted... Royal Artillery | ... | ... | ... | ... | ... |
| Admitted... Royal Engineers | ... | ... | ... | ... | ... |
| Admitted... Army Hospital Corps | ... | ... | ... | ... | ... |
| Admitted... Army Service Corps | ... | ... | ... | ... | ... |
| Total admitted | 3 | 1 | ... | ... | 4 |
| Discharged 1st Battalion, 60th Rifles | 2 | 1 | ... | ... | 3 |
| Discharged Royal Canadian ,, | 1 | ... | ... | ... | 1 |
| Discharged Royal Artillery | ... | ... | ... | ... | ... |
| Discharged Royal Engineers | ... | ... | ... | ... | ... |
| Discharged Army Hospital Corps. | ... | ... | ... | ... | ... |
| Discharged Army Service Corps... | ... | ... | ... | ... | ... |
| Total discharged | 3 | 1 | ... | ... | 4 |
| Total died | ... | ... | ... | ... | ... |
| Obtained sick leave | 2 | ... | ... | ... | 2 |

† Attached to Control Department.

Average Strength of Officers.

| | |
|---|---|
| Staff and Departments | 17 |
| 1st Battalion 60th Rifles | 30 |
| Royal Artillery | 1 |
| Royal Engineers | 1 |
| Total average strength | 49 |

Average Daily Sick of Officers.

| | |
|---|---|
| Staff, &c. | 0·06 |
| 1st Battalion 60th Rifles | 0·11 |
| Royal Artillery | ... |
| Royal Engineers | ... |
| Total average sick | 0·17 |

E. W. YOUNG, M.D., *Surgeon-Major 60th Rifles, P.M.O.*

## VOLUNTEER TROOPS.

RETURN of Sick and Wounded treated in Field General Hospital, Thunder Bay, from 27th May to 26th September, 1870.

| | | Class I. | | | | | | | II. | | | | | | | | | | | | | | | | | | | V. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Order *a.* | | | *b.* | | | * | | 2. | | | | 8. | | 9. | | | | | 10. | | | | 11. | | 13. | | 14. | | | | 2. | | |
| | | Intermittent Fever. | Mumps. | Acute Rheumatism. | Chronic Rheumatism. | Primary Syphilis. | Phthisis Pulmonalis. | Conjunctivitis. | Sclerotitis. | Bronchitis. | Pneumonia. | Pleurisy. | Dyspepsia. | Dysentery. | Diarrhœa. | Obstruction of Bowels. | Hæmorrhoids. | Gonorrhœa. | Epididymitis (gonorrhœal). | Stricture of Urethra. | Varicocele. | Orchitis (not gonorrhœal). | Inflammation (cellular tissue). | Abscess. | Ecthyma. | Ulcer. | Boil. | Onychia. | Contusion. | Wounds. | Total. | Stations. |
| Admitted ... | 1st Bn. Ontario Rifles | ... | 4 | 2 | 1 | 6 | ... | ... | ... | 2 | ... | 1 | ... | 1 | 4 | 1 | ... | 1 | ... | ... | ... | 1 | ... | 1 | ... | ... | ... | 2 | 1 | 1 | 29 | From Toronto to Thunder Bay, in detachments leaving at various dates between 16th May and 5th June, arriving between 3rd and 21st June.<br>In camp, Thunder Bay, and on various detached duties along the 48 miles of road, employed road-making, conveying boats and stores by river, &c., from date of arrival until date of departure from Lake Shebandowan.<br>From Lake Shebandowan by boats to Fort Garry, leaving by detachments, the first on 22nd July, the last on 30th July, and arriving between 27th Aug. and 2nd Sept.<br>Detachment of three companies stationed at Sault Ste. Marie from 16th May to 19th June.<br>Detachment of one company at Thunder Bay until the end of the period. |
| | 2nd „ Quebec „ | 1 | 1 | 9 | 1 | 4 | 1 | 2 | 3 | 7 | 1 | ... | 1 | 2 | ... | ... | 1 | 3 | 1 | 2 | 1 | ... | 1 | 2 | 1 | 3 | 1 | ... | 1 | 1 | 51 | |
| Total admitted ... ... | | 1 | 5 | 11 | 2 | 10 | 1 | 2 | 3 | 9 | 1 | 1 | 1 | 3 | 4 | 1 | 1 | 4 | 1 | 2 | 1 | 1 | 1 | 3 | 1 | 3 | 1 | 2 | 2 | 2 | 80 | |
| Discharged . | 1st Bn. Ontario Rifles | ... | 4 | 2 | 1 | 6 | ... | ... | ... | 2 | ... | 1 | ... | 1 | 4 | 1 | ... | 1 | ... | ... | ... | 1 | ... | 1 | ... | ... | ... | 2 | 1 | 1 | 29 | |
| | 2nd „ Quebec „ | 1 | 1 | 9 | 1 | 4 | 1 | 2 | 3 | 7 | 1 | ... | 1 | 2 | ... | ... | 1 | 3 | 1 | 2 | 1 | ... | 1 | 2 | 1 | 3 | 1 | ... | 1 | 1 | 51 | |
| Total discharged ... ... | | 1 | 5 | 11 | 2 | 10 | 1 | 2 | 3 | 9 | 1 | 1 | 1 | 3 | 4 | 1 | 1 | 4 | 1 | 2 | 1 | 1 | 1 | 3 | 1 | 3 | 1 | 2 | 2 | 2 | 80 | |
| Total died ... ... ... | | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| Invalided ... | 1st Bn. Ontario Rifles | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1 | ... | ... | ... | ... | ... | 1 | .. | ... | 2 | |
| | 2nd „ Quebec „ | ... | ... | ... | ... | ... | 1 | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 3 | |
| Total invalided ... ... | | ... | ... | ... | ... | ... | 1 | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1 | 1 | ... | ... | ... | ... | ... | 1 | ... | ... | 5 | |

Average strength for the above period:—

| | |
|---|---|
| 1st Battalion Ontario Rifles ... ... ... ... | 362 |
| 2nd „ Quebec „ ... ... ... ... | 348 |
| Total average strength ... ... ... | 710 |

Average daily sick in hospital, calculated from the number of diets:—

| | |
|---|---|
| 1st Battalion Ontario Rifles ... ... ... | 2·93 |
| 2nd „ Quebec „ ... ... ... | 4·02 |
| Total average daily sick ... ... | 6·95 |

E. W. YOUNG, M.D.,
*Surgeon-Major 60th Rifles,*
*P.M.O.*

## VOLUNTEER TROOPS.

### DISEASES of Men treated on Line of March, in Boats, &c., from 16th May to 2nd September, 1870.

| Corps. | Class / Order | Syncope. | Dysentery. | Diarrhœa. | Colic. | Whitlow. | Contusion. | Gunshot wound. | | | Total. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Admitted... | 1st Battalion Ontario Rifles. | 1 | 2 | 3 | 1 | 1 | 1 | 1 | ... | ... | 10 |
| | 2nd ,, Quebec ,, ... | (Return not received.) | | | | | | | | | |
| Total admitted ... ... ... | | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Discharged . | 1st Battalion Ontario Rifles. | 1 | 2 | 3 | 1 | ... | 1 | 1 | ... | ... | 9 |
| | 2nd ,, Quebec ,, | (Return not received.) | | | | | | | | | |
| Total discharged ... ... ... | | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Total died ... ... ... ... | | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Total remaining ... ... ... | | ... | ... | ... | ... | 1 | ... | ... | ... | ... | 1 |

### DISEASES of Sick Officers, from 16th May to 2nd September, 1870.

| Corps. | Class / Order | Scarlet Fever. | Dysentery. | Diarrhœa. | Contusion. | | | | Total. |
|---|---|---|---|---|---|---|---|---|---|
| Admitted ... | 1st Battalion Ontario Rifles. | 1 | 1 | 1 | ... | ... | ... | ... | 3 |
| | 2nd ,, Quebec ,, ... | ... | ... | 1 | 1 | ... | ... | ... | 2 |
| Total admitted ... ... ... | | 1 | 1 | 2 | 1 | ... | ... | ... | 5 |
| Discharged. | 1st Battalion Ontario Rifles. | 1 | 1 | 1 | ... | ... | ... | ... | 3 |
| | 2nd ,, Quebec ,, ... | ... | ... | 1 | 1 | ... | ... | ... | 2 |
| Total discharged ... ... ... | | 1 | 1 | 2 | 1 | ... | ... | ... | 5 |
| Total died ... ... ... ... | | ... | ... | ... | ... | ... | ... | ... | ... |
| Remaining ... ... ... ... | | ... | ... | ... | ... | ... | ... | ... | ... |

**Average Daily Sick treated on Line of March, in Boats, &c., during the above period.**

1st Battalion Ontario Rifles ... ... 0·92
2nd ,, Quebec ,, ... ... not yet received.

**Average Strength of Officers.**

1st Battalion Ontario Rifles ... ... ... .... 28
2nd ,, Quebec ,, ... ... ... ... 28
Total Average Strength ... 56

**Average Daily Sick of Officers.**

1st Battalion Ontario Rifles ... ... ... 0·31
2nd ,, Quebec ,, ... ... ... 0·10
0·41

N.B.—The Returns of sick on line of march, &c., of the 2nd Battalion Quebec Rifles has not yet been received, but it is known that the sickness was little or none, and casualties none.

E. W. YOUNG, M.D., *Surgeon-Major 60th Rifles, P.M.O.*

## APPENDIX No. XII.

## MEDICO-TOPOGRAPHICAL AND STATISTICAL REPORT OF THE CONVALESCENT DEPOT AT WELLINGTON, INDIA, FOR THE YEAR 1870.

By Dr. Davidson, Assistant-Surgeon, Royal Horse Artillery.

Introductory Remarks.

Having shortly to appear for examination for promotion, I have written the following Report with a view to presenting it along with my written replies to the examination papers.

I have been induced to select Wellington Depôt as a subject for Report, as I have been stationed here, doing duty with the depôt, during the last twelve months.

As this place has been ably and fully described by others over and over again, I cannot pretend to convey any fresh information regarding it. And I shall therefore endeavour to make my Report as brief as may be consistent with propriety.

Geographical position, &c.

Wellington is situated on the Neilgherry hills, the principal mountain range in Southern India.

The latitude is 11° 5′ N, and its longitude 77° 5′ E. Its height above the sea is about 6,000 feet. The barracks are built on an elevated plateau, lying on a spur of the hills, partly surrounded by a deep ravine, which separates it from the surrounding hills.

Topography.

The station is surrounded by hills, of which the lower slopes, in the vicinity of the barracks are sparsely covered with shrubs and trees; the latter being principally varieties of the Australian gum-tree (*eucalyptus*), acacias, &c.

The highest mountain in this range is named Dodabetta. It is about 9 miles to the north and 2,000 feet above the level of Wellington.

The nearest running water worthy of mention is Waterloo stream. It drains the eastern side of Dodabetta, passes close to the north-west of Wellington, by the cantonment bazaar, through the neighbouring civil station of Coonoor, to the west, and down the Coonoor ghaut till it joins the Bowani river, at the foot of the hills on the south.

Produce.

Various kinds of grain are grown by the agricultural portion of the hill tribes in the vicinity, but only to a limited extent.

Potatoes, onions, turnips, carrots, peas, &c., thrive, as well as European fruits, such as apples, pears, strawberries, &c., blackberries (*scottice* brambles), and what are called hill gooseberries and Brazil cherries grow wild all over the hills.

Tea and coffee plantations are numerous in the neighbourhood. These are chiefly cultivated by Europeans, many of whom are officers who have retired from the service.

Beef and mutton is always procurable.

The bullocks for the former are at present fed up and killed for the troops by the Commissariat; the latter is supplied by a native contractor and is of fair quality.

Geese, ducks, and fowls, are procurable in the market.

There is an abundance of game to be found within a moderate distance of the station; such as the large species of deer called sambhur, the small hog-deer, jungle sheep, &c. Bears, cheetahs, hyenas, jackals, large black monkeys, large brown squirrels, hares &c., also abound; while at a greater distance about the foot of the hills, wild elephants and bison are to be found.

Porcupines are numerous in the vicinity of the station, and are very destructive when they come into the gardens.

There is a fair amount of jungle fowl, quail, snipe, and woodcock shooting to be got within easy distance.

Tigers are also to be met with occasionally on these hills, but not very near Wellington.

There are no fish to be got in the streams about here, but in the Bowani river at the foot of the hills a fish, somewhat like marsheer, is to be got.

Geology. According to Mr. Blankford's geological survey the rocks constituting the Neilgherry hills belong, with a few exceptions, to the schistose or foliated class. The other rocks consist of alluvial deposits, a few basaltic dykes, and some veins of quartz. The surface soil and subsoil is a red ferruginous clay, evidently arising from a decomposition of gneiss.

Climate. The climate is excellent, and the changes of the seasons gradual.

A meteorological observatory was erected (close to the depôt hospital) during the year 1870; a complete set of instruments was supplied by Government, and a superintendent and observer appointed. The former is the Staff Surgeon in charge of the depôt, and the latter is the hospital serjeant.

As the observations were not commenced at the beginning of the year, I am unable to give an accurate statement of the mean temperature, total rainfall, &c., for the year; but from previous records, of a less perfect description, I learn that the average temperature in former years was from 63° to 69° Faht., and the rainfall from 50 to 55 inches annually.

In the months of May, June, and July 1870, rain fell at intervals, but most rain fell during October, November, and December.

Thick cold fogs occasionally envelope the station, and then rheumatic, bronchitic, and dysenteric affections are apt to prevail.

Adjacent Civil stations. The nearest civil stations are Coonoor and Ootacamund. The former is about three miles to the south of Wellington, and at a slightly lower elevation. It lies at the top of what is called the Coonoor Ghaut, the principal means of approach to this place from the south. It consists of a native village with a few native shops and a market place, where a market is held every Tuesday, when every one at Coonoor and Wellington lay in their stock of vegetables, fruit, fowls, grain, &c. required for the week. There are also a number of houses for Europeans about Coonoor. These are chiefly occupied by civil and military officers on leave or retired from the service.

Ootacamund lies about 10 miles to the north of, and at an elevation of about 1,000 feet higher than Wellington. It is a large, scattered station; it possesses a good club, a church, two hotels, several boarding-houses, and a good number of European and native shops. It is largely resorted to by people, not only from the Madras Presidency, but from all parts of India, during the hot weather. It is the seat of the Madras Government during a few months every year.

Native population and their diseases. There are several tribes of natives living on the neighbouring hills; the principal of which are the Bādāgas and the Todas. The former are agricultural in their habits and are chiefly given to the cultivation of grain of various kinds. The latter are a very interesting people, with handsome acquiline features, and a lighter complexion than that of other natives. They are said to be the aborigines and original lords of the soil, and accordingly the other hill tribes pay tribute to them for the land they occupy.

One of the peculiarities of the Todas is their being addicted to the custom of polyandry, or that of a woman marrying a plurality of husbands. They are pastoral and migratory in their habits, and possess large herds of buffaloes and other cattle.

A complete history of the various hill tribes on the Neilgherries and their respective customs would be very interesting, but would occupy too much time and space to be given here, besides being slightly beyond the province of this report.

The natives generally are very healthy, but those who come up from the plains, generally camp-followers and officers' servants, &c., are apt to suffer from fever and sometimes from diarrhœa and bronchitis during the rainy season.

The cantonment native bazaar is about three-quarters of a mile from barracks on one of the roads leading to Coonoor. It is neat and clean, well built and well drained.

Time of arrival and departure of convalescents.

Invalids and convalescents are sent here from the various stations in the Madras Presidency and from British Burmah, chiefly during the months of November, December, January, and February; and during the same time of the year men who have been at Wellington for some time and are found to have so far benefited by the change as to be able to return to duty in the plains, are sent to rejoin their corps.

The nearest railway station is Coimbatore, about 32 miles from the foot of the hills, and on the line of railway running from Madras on the east to Beypore on the western coast. From Coimbatore, parties of invalids coming to Wellington are conveyed in common country bullock-carts to Metapollium, a distance of 27 miles. Here there is a rest-house where they remain for a few hours and get a meal; after which they proceed, in the same way, on to Kullar at the foot of the hills, a distance of 5 miles. From Kullar the men, who are able march, and the rest along with the families are carried in carts to Wellington. There is an old and a new road from Kullar to Coonoor; the former is steeper but shorter by several miles, but the latter though longer is very good and fit for carriages and carts. The distance from the foot of the hills to Wellington, by the new road, is about 19 miles.

Near Burliar, a place about half way down the ghaut, parties arriving and departing halt for half an hour and have tea or coffee served out to them.

Barracks, &c.

The barracks are in the form of a parallelogram, consisting of five double-storied blocks and one single-storied block. They were built in 1852-53. Their relative position, construction, and appearance will be best understood by reference to the accompanying skeleton map and rough plan.

The eastern block is occupied, in its upper story, by Staff-Serjeants' quarters (each of which consists of four rooms, two large and two small ones), orderly-room, Paymaster's and Quartermaster's offices, and masonic lodge-room. The lower story is appropriated to the Serjeants' mess, Quarter-master's stores, guardroom, and workshops.

The first, or eastern, of the two blocks lying on the south side of the square is taken up with the Protestant and Roman Catholic places of worship on the ground floor; and by the depôt theatre, coffee shop, and soldiers' reading-room, upstairs.

The other three blocks are occupied by the men.

The sixth (single-storied) block is on the north-west side of the square. It was formerly used as the Protestant Church and Catholic Chapel, but it was burnt some years ago, and now the walls only are standing.

There is, at present, a rumour that it is to be restored and an upper story to be added to it.

The several buildings are all on the same plan, both up and downstairs, as shown in the accompanying ground plan; with the exception of the block used for Staff-Serjeants &c., which is slightly modified to suit its special purpose.

The barracks are built of brick and mortar, and plastered both outside and inside. They are extremely comfortable and well constructed. The floors are of wood and the roofs are tiled. There is a fireplace at both extremities of the long rooms occupied by soldiers; and to each of these rooms there is a Serjeant's quarters consisting of two apartments situated at the ends of the buildings. The doors and windows are glazed. There is a front open verandah to each storey, facing the square; and back closed verandahs which are used as mess-rooms.

The floors in the lower stories are raised 18 inches above the ground, and a free current of air is constantly passing beneath by ventilating passages.

Ventilation.

Ventilation is efficiently carried on by means of swing windows, of about 3 feet square, and small openings of about 6 inches square near the roof, as well as by perforated ventilating openings, about 6 inches square, placed at intervals along the scantling and close to the floor.

Heating.

There are fireplaces in every room, for each of which 50 lbs. of firewood per diem is allowed from October to March inclusive; and 100 lbs. each per diem during the months of November, December, January, and February.

Cooking.

The cook rooms are situated in each end of the buildings (*see* plan), and the

ly.

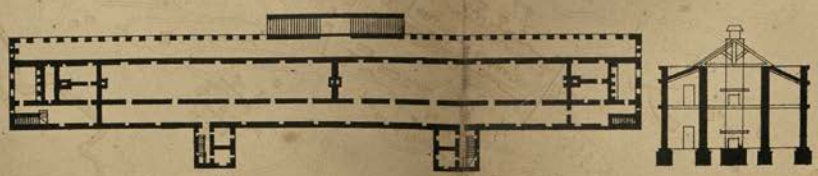
h.

Vincent Brooks, Day & Son, lith.

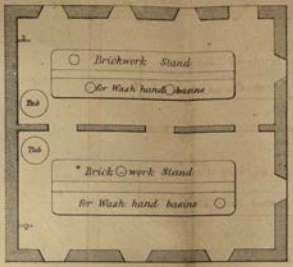
SKELETON PLAN OF WELLINGTON BARRACKS & PORTION OF CANTONMENTS

IN THE IMMEDIATE VICINITY SHOWING MOST OF THE OFFICERS' BUNGALOWS.

1870.

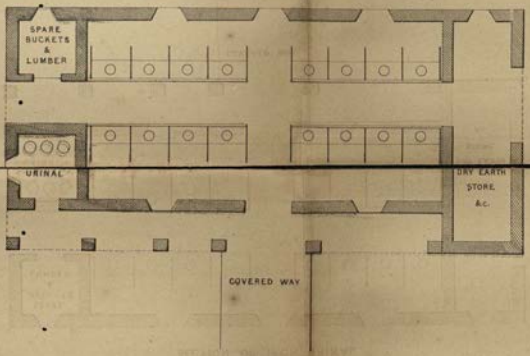


GROUND PLAN & SECTION OF BARRACK AT WELLINGTON.




ROUGH PLAN OF LAVATORY FOR THE SOLDIERS AT WELLINGTON.
1870.

SECTION OF IRON URINAL.




ROUGH PLAN OF SOLDIERS LATRINE AT WELLINGTON.

Vincent Brooks, Day & Son, Lith.

cooking is carried on in the usual Indian fashion under the superintendence of a European.

The cooking pots are made of copper, and are regularly tinned once a fortnight.

Rations. The rations are of good quality and consist of 1 lb. of beef per diem, five days in the week, and two days mutton, 1 lb. of bread, 4 ounces of rice, 12 ounces of potatoes, 4 ounces of vegetables, and $\frac{4}{7}$ ounce of tea, $2\frac{1}{2}$ ounces of sugar, 1 ounce of salt, and 3 lbs. of firewood per man. The soldiers have three meals a day, viz.: at 8 A.M., 1 P.M., and 4 P.M. The vegetables are good and generally abundant. About one half the quantity supplied in the rations is from the soldiers' gardens; the men who cultivate them being remunerated at the contract rate. The proportion of vegetables entering into the constitution of the ration is 12 ounces of potatoes, and 4 ounces of cabbage, turnips, carrots &c. When the latter are not obtainable in sufficient quantity potatoes are issued in lieu.

Canteen—Liquor, &c. The canteen is well regulated; it is open from 12 noon to 2 P.M., and from 6 to 8 P.M. The men get a quart of beer each (ale or porter), and a dram of arrack daily. They are allowed to take their malt liquor away with them to their dinner if they choose to do so.

Water supply. The drinking water is good. There is a plentiful supply of it in wells which have been made on the hill side, a short way above barracks. It is conveyed thence by a pipe to a place close to the barracks, whence it is carried, in large mussacks (bags made of hide) slung over the backs of bullocks, by the puckallies (water-carriers), and by them distributed to the filters, which are placed in the different barrack verandahs. These filters consist of three chatties (pots made of burnt clay) placed one above the other on tripod stands. The upper two contain some coarse sand and charcoal, and have a small hole in their bottoms to allow the water to percolate to the chatty below. I am unable to give an analytical report of the qualities of the water, as the Government box of apparatus and re-agents for chemical analysis has not yet been supplied to this station.

The water for ablutionary purposes is collected by channels circling the slopes of the adjoining hill, and is stored in a large reservoir at some height above the barracks (*see* sketch map). Thence it is conveyed by pipes into the several lavatories and barrack rooms.

Lavatories. There is ample accommodation for ablution. Behind each block of men's barracks there is a lavatory, of which a rough ground-plan without scale or measure is appended.

Water is laid on to each compartment by pipes. There are two long double stands of brickwork, for the men's basins, in each washhouse.

Every soldier has now a basin of his own, for which he is responsible. Recently, at Staff-Surgeon Carter's recommendation, two half-cask tubs have been placed in every wash-house. The refuse water is carried away by drains.

Plunge bath. There is an excellent swimming bath for the use of the soldiers. It is 70 feet long by 20 feet broad and 6 feet deep. It is near barracks and close to the racquet court.

Drainage. All round the border of the barrack-square there is a neatly made open channel, lined with stone. It is about 10 inches deep and a foot in breadth, and carries off the surface water and the rain which is led down by pipes from the roofs of the buildings.

The sewage is carried off by covered drains to the main drain in the vicinity.

Latrines. For the eastern block, occupied by Staff-Serjeants, there is a latrine at each end of the building down stairs, and connected with the upper verandah by outside covered stairs; each Staff-Serjeant has a closet with lock and key for himself.

Behind each block occupied by the men there is a latrine connected with the backstairs by a covered way (rough plan appended). At the head and foot of the backstairs there are also what are called "night latrines," but only those below are now used as the upper ones were recently ordered by the Commander in Chief to be closed on account of their being offensive. In all the latrines

a compartment is fitted up as a urinal, and supplied with iron vessels with an enamelled basin at the top to hold charcoal (*see* sketch).

The latrines, each contain sixteen seats, separated by partitions and are supplied with iron buckets. The dry earth system is followed. The earth is placed at hand, ready for use, in boxes raised on wooden stands and furnished with small hand scoops or shovels.

There is also a room for storing the dry earth. The excreta &c., are removed by conservancy carts to a place about a mile from barracks and there emptied into cesspits and covered with earth. This, after a time, forms excellent manure and is sold periodically by Government.

Clothing. Cloth clothing is used all the year round. During the summer the loose serge coat is worn on parades, but in the cold weather the cloth tunic is used. The ordinary Indian wicker helmet, covered with white cotton, is always worn during the day; for though the atmosphere may be pleasant and cold, the rays of the sun are very powerful and require to be guarded against. Greatcoats are worn on night sentry duty.

Bedding, &c. Each man has an iron cot, one straw mattress, two blankets, two sheets, and one setringee. The straw in the mattress is changed every three months.

Duties, &c. The duties of the men are light and consist of sentry duty and ordinary barrack fatigues. Some men have been employed in clearing away surplus brushwood in the neighbourhood of barracks, but this was voluntary labour for which they were remunerated at the usual rate of working pay.

The parades are as follows: the Commandant's parade every Monday; parade for medical inspection every Saturday; church parade on Sundays; and the usual daily roll calls.

The men are also exercised in route marching every Wednesday, when the weather permits.

Sometimes a soldiers' picnic is substituted for the marching out; it is however a voluntary thing. All soldiers wishing to join are invited to send in their names on the previous day so that the necessary arrangements may be made. The Staff Officer selects some picturesque spot easy of access at a distance of four or five miles from the station, and has tents pitched there in readiness for the men. Rations and malt liquor are sent out in carts, accompanied by native cooks and cooking-pots, &c.

The men march from barracks at 6 A.M., and on arrival at the picnic camp they have their breakfast; after which they beat for game or amuse themselves as they like till dinner time. After dinner athletic sports such as foot-races, jumping, &c., for prizes fill up the time till evening. The prizes (money) are given on the spot to the winners. This is a very good plan. About dusk the party returns to barracks.

These picnics are much appreciated by the men, and are always joined in by the officers. They were instituted by the present Commandant, Lieutenant-Colonel Collingwood, of the 21st North British Fusiliers, and owe much of their success to the excellent arrangements of the station Staff Officer Captain Yeldham, of the 18th Hussars. who has done so much for the amusement and improvement of the soldiers at Wellington since he came to this station.

There are three guards, viz., at the main guard-room, the provost cells, and the hospital. All the men—Artillery, Cavalry, and Infantry take their turn of this duty alike.

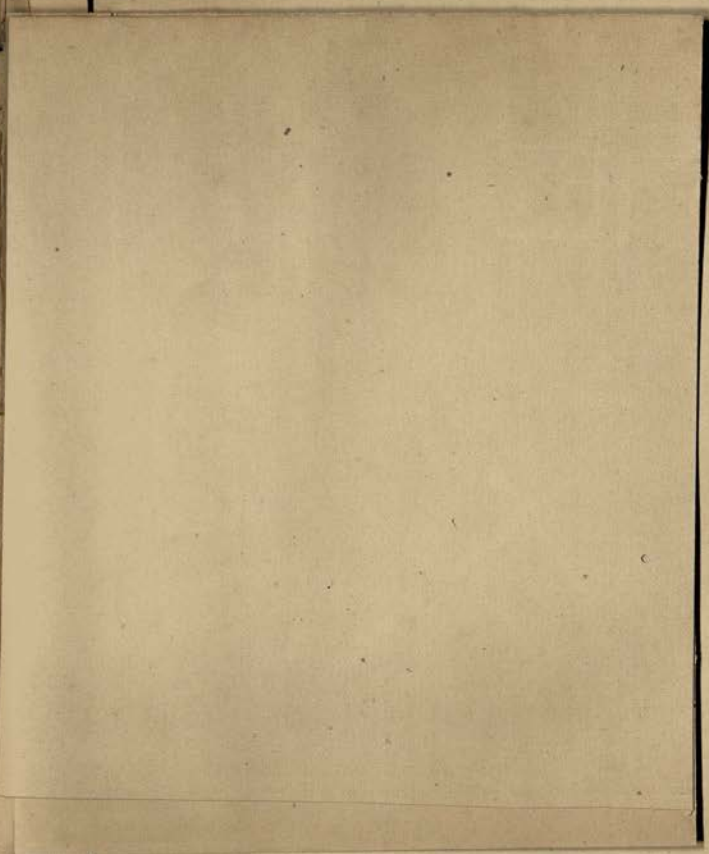
Nights in bed. During the past year the average nights in bed have been from eleven to twelve between each tour of duty.

The means of amusement and recreation are ample and excellent.

Amusements and recreation There is a racquet-court for the officers, &c., and a fives'-court and skittle-alley for the men.

A gymnasium has been recently erected.

There is a good reading room for the soldiers, well supplied with newspapers and periodicals; draughts, chess, and dominoes, &c., and a good library. By a recent order of the Commander-in-Chief, the soldiers are allowed (as a tentative measure) to play at cards in the reading room, but not for stakes. This indulgence is likely to be beneficial, as men were formerly addicted to going out and playing at cards surreptitiously in some secluded place in the



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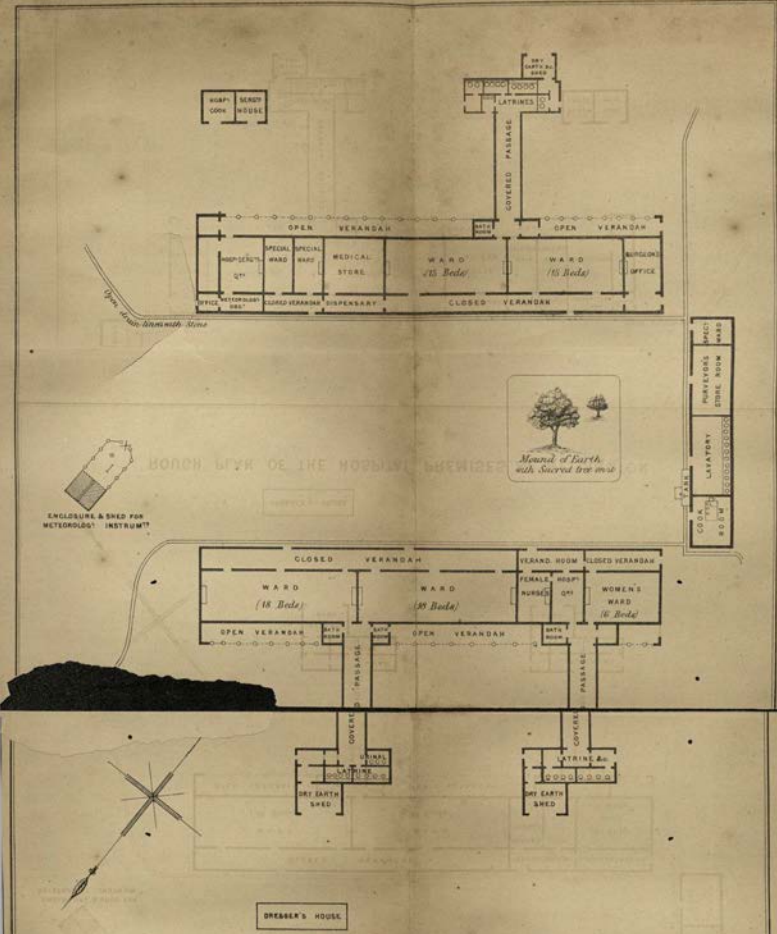
Room.




ROUGH PLAN OF THE HOSPITAL PREMISES AT WELLINGTON

Vincent Brooks, Day & Son, Lith.

neighbouring jungle, and in this way, not unfrequently, contracted dysentery and colds from sitting on damp ground.

The serjeants have a reading room and a billiard table in their mess.

There is a very nice theatre in barracks, and several highly successful pieces have been acted during the year. The Wellington Dramatic Society is composed of officers and men of the depôt, and is most ably managed by Captain Yeldham, himself a dramatic author of no mean talents.

The theatre is also used for penny readings once a month, Christy Minstrel performances, evening dances, &c.

Taking advantage of the presence, this year, of several bandsmen and a bandmaster among the convalescents, instruments were purchased, and a temporary band was formed. This contributed much to the enjoyment, not only of the men of the depôt, but of the residents in the neighbourhood.

A cricket club, composed of officers and men, plays every week during the season. The cricket ground is a particularly good one, and is about half a mile from barracks.

Two race meetings, accompanied by athletic sports for soldiers, were got up during the year, and were very successful.

Many of the men employ their leisure time in making collections of moths, butterflies and beetles, and of ferns, of all of which there are a great many, and beautiful varieties to be found on these hills. Such men as possess guns frequently go out shooting.

Workshops. There is an armourer serjeant's, a carpenter's, and a shoemaker's shop. The two latter are under the superintendence of one of the officers doing duty at the depôt.

Soldiers' gardens. The soldiers' gardens are situated close to barracks. All soldiers who choose to pay four annas (sixpence) a month to the garden fund are supplied with what garden tools and seeds they require. A considerable number of the men employ their time in gardening. They chiefly raise such vegetables as potatoes, cabbage, cauliflower, peas, turnips, and carrots; and, to encourage them, a horticultural show is held annually, and prizes given to the exhibitors (and *growers*) of the best specimens.

Coffee Shop. There is a coffee shop attached to the soldiers' reading room. It is managed by a serjeant, and superintended by an Officer. Here the men can get coffee, cold beef, ham, sausages, Australian meat, bread, pickles, preserves, cheese, stationery, candles, &c., &c., and all at moderate prices.

School. A large and well ventilated building, which was originally used as the Officers' mess house when a regiment was quartered here, is used as a boys' and girls' school. It is managed by an army schoolmaster and schoolmistress.

Married men's quarters. The quarters for married men consist of four double-storied blocks (see map at page 476), with front and back open verandahs. Access to the upper stories is obtained by two outside stone stairs, one at both ends of each block and leading up to the front verandah, and also by one outside stone stair leading to the centre of the back verandah.

Each family has two rooms and one fire-place. In the lower stories the floors are of asphalte laid on a substratum of brick, and raised about 18 inches above the ground, free ventilation underneath being provided for. The upper floors are wood. The roofs are tiled.

The ventilation of the quarters is satisfactory, and is effected by the same means as in barracks, already described.

Latrines and lavatories for the men and women separately, are situated at a short distance to the rear of the quarters, and are connected with the lower back verandahs by a covered way.

There is a plentiful supply of water for ablution laid on by pipes, and there is a tub in every bath room. The dry-earth system is used in the latrines, and the conservancy arrangements and drainage are carried on in the same way as in barracks.

There are no cook-houses. Each family cook in their own quarters.

Guard Room. The main guard room is situated on the ground floor of the eastern block of barracks. It consists of a room for the guard, a prisoners' room, and three cells for any prisoners who may require temporary separate confinement. The means for ventilation of the cells is satisfactory. The ventilation of the guard

Cells.

Hospita

Depôt Sts

Officers.

Officer, who hold their appointments for two years, and the Commissariat Officer, whose tenure of office varies. The Staff Officer performs the duties of Adjutant, Quartermaster, and Paymaster. The Surgeon, besides having medical charge of the depôt, generally holds the extra appointments of medical charge of the lock hospital, of the native detail hospital, and of superintendent of the meteorological observatory, for two of which extra emoluments are allowed.

Two Assistant-Surgeons (as a rule regimental officers) are usually here, though for some months back there has been only one. Their general time at Wellington is one year.

The other officers on duty here have no fixed time, but generally remain for about 12 months from the date of arrival.

There is no officers' mess. There are plenty of good bungalows with gardens attached and at moderate rents, on the slopes of the hills in the vicinity of barracks; these are occupied by the officers.

A billiard room and a reading room for the officers has been established by Messrs. Framjee and Co., the Parsee merchants here. These rooms are under the management of a committee, consisting of the Commandant, the Chaplain, and one of the senior officers of the depôt.

I shall now proceed to give a short account of the diseases for which men have been admitted to hospital here during the year, but before doing so I may as well show what variations have taken place in the strength of the depôt. Diseases.

| | | | |
|---|---|---|---|
| Strength January 1st, 1870 .. .. .. | | | 147 |
| Arrivals during the year .. .. .. | | | 596 |
| Total .. .. .. | | | 743 |
| Departures to rejoin Corps .. .. | 326 | | |
| Invalided to England .. .. | 67 | | |
| Transferred to Poonamallee .. | 31 | | |
| | | | 429 |
| Strength remaining 31st December, 1870 .. | | | 314 |

CLASSIFIED STATEMENT of Diseases, Admissions, and Deaths at the Convalescent Depôt at Wellington for the Year 1870.*

Neuralgia (cephalagia) has been the cause of a considerable number of admissions to hospital. This is rather a common complaint amongst the men men here, especially after first arrival, and is perhaps attributable to the rarefied state of the atmosphere.

There was a large number of admissions for dyspepsia; a great proportion of these were the result of drink.

The greatest number of admissions from one cause were cases of ague and fever, almost all of which were in men who had contracted the disease in the plains before coming here.

Men who have suffered from fever generally derive great benefit from a residence on the hills. The diseases which do not suit this climate, and are usually aggravated by it, are diarrhœa and dysentery, secondary syphilis, rheumatism, and heart complaints. Cholera is unknown here.

The admissions and average strength during each quarter are shown in the following Table :—

QUARTERLY Admissions, &c., 1870.

| | 1st. | 2nd. | 3rd. | 4th. |
|---|---|---|---|---|
| Average Strength. .. | 223 | 512 | 553 | 362 |
| Total Admissions .. | 89 | 243 | 231 | 162 |

* It is not considered necessary to insert these.

room and prisoners' room would be greatly improved by making iron-barred windows in the partition which separates them, so as to allow of the free perflation of air from the guard-room doors, on one side, to the windows at the back of the prisoners' room, on the other.*

Cells. The provost cells are situated in the lower story of the third block of married men's quarters. They are roomy and well ventilated. The upper floor being removed, each cell extends up to the roof of the building. They are under the supervision of a provost serjeant, and are visited daily by the orderly Officer and by a Medical Officer.

The men undergoing imprisonment are employed in keeping the vicinity of the cells and married men's quarters clean, in good order, and free from weeds.

Shot-drill is not employed as a punishment.

Hospital. The hospital buildings form three sides of a square. They lie on a branch of the spur of the hill on which the barracks are situated, and at a slightly lower elevation. The position of the hospital, in relation to the barracks, will be easily seen by reference to the accompanying map of the station (page 476); and the accommodation afforded for sick, as well as the appropriation of the different parts of the hospital, will be best understood by referring to the subjoined rough ground plan.

The hospital is single-storied, built of brick and mortar, plastered within and without, floored with wood, and roofed with tiles. The floors are raised 18 inches above the ground and free ventilation is provided for underneath. The wards are ventilated by swing windows, about 3 feet square, placed at intervals near the roof, as well as by the lower windows and doors, and by small perforated openings, 6 inches square, in the scantling close to the floor. There are two fire-places in each of the larger wards, one in either end, and one in each of the small rooms.

There is a ward for the treatment of women, with a nurse's questers adjoining to it, in the end of the north block.

The front verandahs, facing the square, are closed, and are used as mess-rooms. The back verandahs are open.

In the immediate vicinity of the hospital there are several buildings not shown in the accompanying plan, viz., the purveyor's principal store, the dead house, lock hospital, detail hospital for the treatment of natives connected with the depôt, and a large shed for the sick carts and dhoolies.

There is an ablution room fitted up with a row of fixed basins to which water is conveyed by a pipe from a tank outside. There are also bath rooms connected with each ward. The latrines and urinals are connected with the back verandahs by covered passages.

Iron cots, with coir mattresses are used.

The cook-house is fitted up with an American cooking range. The arrangement for drainage, removal of sewage and soil, the supply of drinking water and of water for ablution, are the same as those in barracks as already described.

The dry-earth system is adhered to here also. Two small rooms in the south block, originally intended for an apothecary but found unsuitable, are used as wards for special cases. There are no proper separate apothecaries' quarters. The head apothecary, and one of the juniors, are at present provided with rooms in the lower flat of the school building, while another has had one of the soldiers' quarters in the married men's range given to him.

Depôt Staff. The permanent non-commissioned staff of the depôt consists of a Serjeant-Major, Paymaster-Serjeant, Quartermaster-Serjeant, Hospital-Serjeant, Schoolmaster and Schoolmistress, Commissariat Serjeant, Armourer Serjeant, and a Serjeant of the Public Works Department.

There are several medical (the number varies) subordinates always attached to the hospital.

Officers. The officers of the depôt may be divided into the staff, and the officers doing temporary duty.

The former consists of the Commandant, the Surgeon, and the Station Staff

* Since the above was written Colonel Collingwood has given orders to have the suggested improvement carried into effect.

Officer, who hold their appointments for two years, and the Commissariat Officer, whose tenure of office varies. The Staff Officer performs the duties of Adjutant, Quartermaster, and Paymaster. The Surgeon, besides having medical charge of the depôt, generally holds the extra appointments of medical charge of the lock hospital, of the native detail hospital, and of superintendent of the meteorological observatory, for two of which extra emoluments are allowed.

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| Total .. .. .. | | | 743 |
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| Invalided to England .. .. | 67 | | |
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Men who have suffered from fever generally derive great benefit from a residence on the hills. The diseases which do not suit this climate, and are usually aggravated by it, are diarrhœa and dysentery, secondary syphilis, rheumatism, and heart complaints. Cholera is unknown here.

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| Total Admissions .. | 89 | 243 | 231 | 162 |

* It is not considered necessary to insert these.

Of the more important diseases, the numbers occurring in each quarter are here shown.

| | Admissions. | | | |
|---|---|---|---|---|
| | 1st. | 2nd. | 3rd. | 4th. |
| Ague .. .. .. .. | 32 | 73 | 53 | 22 |
| Dysentery .. .. .. .. | 2 | 6 | 12 | 4 |
| Diarrhœa .. .. .. .. | 3 | 10 | 7 | 6 |
| Hepatitis .. .. .. .. | 1 | 8 | 9 | 2 |
| Diseases of Respiratory System .. | 4 | 4 | 11 | 18 |

By the above it appears that the greatest number of admissions for these diseases took place during the second and third quarters.

The total admissions from all causes in each month, as well as the average strength, is shown in the next table:—

| | Months. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | March. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Average Strength .. | 188 | 214 | 266 | 466 | 532 | 550 | 531 | 559 | 571 | 442 | 354 | 314 |
| Admissions .. .. | 19 | 31 | 39 | 93 | 83 | 67 | 93 | 60 | 78 | 72 | 57 | 33 |

This shows the greatest number of admissions to have been in the months of April and July.

It may be well also to look at the average daily sick, and its proportion to the strength of the depôt in the different months throughout the year.

PROPORTION of Sick to Strength in each Month, 1870.

| Month. | Strength. | Average Daily Sick. | Percentage of Sick to Strength. |
|---|---|---|---|
| January .. .. .. | 188 | 18·35 | 9·70 |
| February .. .. .. | 214 | 20·50 | 9·58 |
| March .. .. .. | 266 | 26·85 | 10·09 |
| April .. .. .. | 466 | 39·82 | 8·54 |
| May .. .. .. | 532 | 45·21 | 8·49 |
| June .. .. .. | 550 | 46·35 | 8·43 |
| July .. .. .. | 531 | 41·45 | 7·80 |
| August .. .. .. | 559 | 36·78 | 6·58 |
| September.. .. .. | 571 | 37·97 | 6 65 |
| October .. .. .. | 442 | 35·28 | 7·98 |
| November.. .. .. | 354 | 40·75 | 11·51 |
| December .. .. .. | 314 | 23·00 | 7·32 |

This shows the greatest number of daily sick to have been during the months of May, June, July, and November, and the highest percentage in March and November. (The average daily sick for the year is about 34.)

CAUSES of Mortality, and Proportion of Deaths to Strength. (Average Strength for the Year 415.)

| Class. | Order. | Disease. | Number of Deaths. | Proportion to strength per 1,000. |
|---|---|---|---|---|
| I. | 1. Subdivision B. .. | Phthisis, Pulmonary .. | 1 | 2·38 |
| II. | 5. Circulatory System.. | Aneurism, Aorta .. | 1 | 2·38 |
| | 8. Respiratory „ | *a.* Pneumonia .. .. | 1 | 2·38 |
| | | *b.* Pleurisy .. .. | | |
| | 9. Digestive „ .. | Dysentery .. .. | 1 | 2·38 |
| | „ „ .. | Hepatic Abscess .. | 1 | 2·38 |
| | | Total .. .. | 5 | |

I will presently give a short account of each of the fatal cases, along with the post-mortem appearances.

Of the 596 men who arrived here during 1870 a number were men of the 21st Regiment, which suffered so much from fever at Kurrachee, and, in consequence, was removed to this presidency early in the year and was stationed at Bangalore.

The men who were sent to the hills were chiefly young soldiers. Many of them had frequent and severe returns of fever even here for the first few months after arrival, but ultimately they shook it off, and all of them seemed to have derived much benefit from the climate.

During the year 326 men have returned to duty with their corps in the plains.

Sixty-seven men were invalided to England. Their diseases were as follows:— Invalids.

INVALIDED to England.

| Diseases. | No. |
|---|---|
| Ague and Debility .. .. .. .. | 10 |
| Secondary Syphilis .. .. .. .. | 3 |
| Scofula .. .. .. .. .. .. | 1 |
| Morbus Coxæ .. .. .. .. .. | 1 |
| Chron. Rheumatism .. .. .. .. | 4 |
| Anœmia .. .. .. .. .. | 2 |
| Cephalalgia .. .. .. .. .. | 6 |
| Amaurosis .. .. .. .. .. | 1 |
| Ophthalmia and Debility .. .. .. | 1 |
| Deafness .. .. .. .. .. | 1 |
| Valvular Disease of Heart (Mitral) .. .. | 1 |
| Hypertrophy of Heart.. .. .. .. | 1 |
| Dysentery .. .. .. .. .. | 4 |
| Diarrhœa .. .. .. .. .. | 4 |
| Hæmorrhoids .. .. .. .. .. | 2 |
| Hepatitis .. .. .. .. .. | 7 |
| Dyspepsia .. .. .. .. .. | 2 |
| Chron. Synovitis .. .. .. .. | 1 |
| General Debility .. .. .. .. | 15 |
| Total .. .. .. .. | 67 |

Thirty-one men were transferred to Poonamallee Depôt near Madras, as the climate of Wellington was unsuitable for their complaints. Their diseases are shown in the following Table:—

TRANSFERS to Poonamallee.

| Disease. | No. |
|---|---|
| Primary Syphilis (Suppurating Bubo) .. | 1 |
| Secondary Syphilis .. .. .. .. | 3 |
| Chron. Rheumatism .. .. .. .. | 6 |
| Chron. Bronchitis and Debility .. .. | 1 |
| Dysentery .. .. .. .. .. | 1 |
| Hepatitis .. .. .. .. .. | 3 |
| Diarrhœa .. .. .. .. .. | 4 |
| Hæmorrhoids .. .. .. .. .. | 3 |
| Dyspepsia and Splenitis .. .. .. | 1 |
| Dyspepsia and Debility .. .. .. | 1 |
| Dyspepsia .. .. .. .. .. | 2 |
| Stricture of Urethra .. .. .. .. | 1 |
| General Debility .. .. .. .. | 4 |
| Total .. .. .. .. | 31 |

Sickness of Officers.

Generally speaking the Officers have been healthy. The amount of sickness among them is shown in the next Table :—

OFFICERS.

| | |
|---|---|
| Average Strength .. .. .. .. | 14·10 |
| Average Daily Sick .. .. .. .. | ·84 |

| Class. | Order. | Disease. | Admitted. | Died. |
|---|---|---|---|---|
| I. | 1A. | Simple Continued Fever.. .. | 1 | .. |
| | | Ague, quotidian .. .. .. | 1 | .. |
| II. | 1. | Neuralgia (Cephalalgia) .. .. | 1 | .. |
| | 9. | Tonsillitis .. .. .. .. | 1 | .. |
| | | Hepatitis .. .. .. .. | 1 | .. |
| | 13. | Abscess .. .. .. .. | 1 | .. |
| | 14. | Ecthyma .. .. .. .. | 1 | .. |
| | | Psoriasis .. .. .. .. | 3 | .. |
| III. | .. | General Debility .. .. .. | 2 | .. |
| | | Total .. .. .. | 12 | .. |

The causes of admissions and deaths of women are shown in the next Table :—

WOMEN. Women.

Average Strength .. .. .. .. 97·71
Average Daily Sick.. .. .. .. 4·13

| Class. | Order. | Disease. | Admitted. | Died. |
|---|---|---|---|---|
| I. | 1A. | Simple Continued Fever.. .. | 5 | .. |
| | | Ague, quotidian .. .. .. | 12 | .. |
| | | „ irregular .. .. .. | 8 | .. |
| | | Remittant Fever .. .. .. | 1 | .. |
| | | Acute Rheumatism .. .. | 1 | .. |
| | | Phthisis Pulmonalis .. .. | 1 | 1 |
| II. | 1. | Hysteria .. .. .. .. | 1 | .. |
| | | Neuralgia (Cephal.) .. .. | 2 | .. |
| | 2. | Conjunctivitis .. .. .. | 1 | .. |
| | 8. | Laryngitis Chronica .. .. | 1 | .. |
| | | Bronchitis Acuta.. .. .. | 1 | .. |
| | | „ Chronica .. .. | 1 | .. |
| | 9. | Tonsillitis .. .. .. .. | 3 | .. |
| | | Ulcerated Throat.. .. .. | 4 | .. |
| | | Quinsy .. .. .. .. | 1 | .. |
| | | Dyspepsia .. .. .. .. | 14 | .. |
| | | Dysentery .. .. .. .. | 3 | .. |
| | | Diarrhœa .. .. .. .. | 7 | 1 |
| | | Colic .. .. .. .. | 3 | .. |
| | | Tænia Solium .. .. .. | 2 | .. |
| | | Hepatitis .. .. .. .. | 1 | .. |
| | 13. | Abscess .. .. .. .. | 1 | .. |
| | 14. | Ulcer .. .. .. .. | 1 | .. |
| | | Boil .. .. .. .. | 1 | .. |
| III. | .. | General Debility .. .. .. | 24 | .. |
| V. | 2. | Contusion, breast.. .. .. | 1 | .. |
| | | „ side .. .. .. | 1 | .. |
| | | „ abdomen .. .. | 1 | .. |
| | | Ulcer of Uterus .. .. .. | 1 | .. |
| | | Hæmorrhage .. .. .. | 2 | .. |
| | | Abortion .. .. .. .. | 3 | .. |
| | | Menorrhagia .. .. .. | 1 | .. |
| | | Total .. .. .. | 110 | 2 |

There was nothing of special interest in the above cases, and time will not permit of my giving an account of the cases which terminated fatally.

The children were generally healthy. Chicken-pox prevailed for some time among them. 15 cases of this disease were admitted into hospital, but many more were treated in their quarters, partly because there was no room in hospital and partly owing to the mildness of the disease. The admissions and deaths of children are classified below :— Children.

CHILDREN.

Average Strength .. .. .. .. 198·43
Average Daily Sick.. .. .. .. 5·40

| Class. | Order. | Disease. | Admitted. | Died. |
|---|---|---|---|---|
| I. | A | Chickenpox .. .. .. | 15 | .. |
| | | Simple Continued Fever.. .. | 2 | 1 |
| | | Ague, quotidian .. .. .. | 7 | .. |
| | | „ irregular .. .. .. | 19 | .. |
| | | Remittant Fever .. .. .. | 3 | .. |
| | | Mumps .. .. .. .. | 2 | .. |
| | B | Tabes Mesenterica .. .. | 1 | 1 |
| | | Anæmia .. .. .. .. | 1 | .. |
| II. | 1. | Atrophy .. .. .. .. | 1 | 1 |
| | | Encephalitis .. .. .. | 1 | .. |
| | | Meningitis .. .. .. .. | 1 | 1 |
| | 2. | Conjunctivitis .. .. .. | 11 | .. |
| | | Ectropium .. .. .. .. | 2 | .. |
| | 6. | Inflammation of Glands .. .. | 1 | .. |
| | 8. | Croup .. .. .. .. | 1 | .. |
| | | Bronchial Catarrh .. .. | 7 | .. |
| | | Bronchitis Acuta.. .. .. | 7 | .. |
| | | Pneumonia .. .. .. | 1 | 1 |
| | 9. | Cancrum Oris .. .. .. | 1 | 1 |
| | | Tonsillitis .. .. .. .. | 4 | .. |
| | | Dyspepsia.. .. .. .. | 1 | .. |
| | | Dysentery.. .. .. .. | 9 | .. |
| | | Diarrhœa .. .. .. .. | 12 | 2 |
| | | Teething .. .. .. .. | 16 | .. |
| | | Colic .. .. .. .. | 2 | .. |
| | | Tænia Solium .. .. .. | 2 | .. |
| | | Ascaris Lumbric... .. .. | 1 | .. |
| | 14. | Ulcer .. .. .. .. | 7 | .. |
| | | Boil .. .. .. .. | 1 | .. |
| | | Urticaria .. .. .. .. | 1 | .. |
| III. | | General Debility .. .. .. | 11 | .. |
| V. | 2. | Contusion, hip .. .. .. | 1 | .. |
| | | „ elbow .. .. .. | 1 | .. |
| | | Wound of finger .. .. .. | 2 | .. |
| | | „ foot .. .. .. | 1 | .. |
| | | „ knee .. .. .. | 1 | .. |
| | | Burn .. .. .. .. | 1 | .. |
| | | Total .. .. .. | 159 | 8 |

Time will not allow of my giving an account of each of the fatal cases among women and children. The case of cancrum oris which proved fatal was in a girl of about 10 years of age, who had very severe remittent fever.

Among the soldiers there were no cases of any special importance occurred during the year besides those which terminated fatally; and as I have already occupied too much space, I shall now proceed at once to give a short account of each of the latter.

Deaths.

1. *Case of No.* 381, *Private J. Johnston, 18th Hussars.*

A. Pneumonia.
B. Pleurisy.

This man was admitted into hospital on the 15th February, 1870, suffering from symptoms of pneumonia affecting the lower part of the left lung, the result of exposure to cold.

The disease progressed, and on the 21st of February there were also signs of pleuritic effusion on the left side. After this the pneumonia subsided, but

the pleuritic effusion increased, and the patient became very low, suffering from nausea and vomiting, night sweats and great debility, with irregular pulse and great thirst.

From the 27th of February there was fulness observable on the left side, with slight bulging of the intercostal spaces and great pain between the 6th and 8th ribs in a line below the heart. On the 17th March a pericardial bruit was noticed. From the 20th March he had a return of slight cough with purulent expectoration. From the 23rd March a fluctuating tumour became apparent between the 7th and 8th ribs in the situation above referred to, and by the 28th it became so evident that the pleuritic fluid was pointing in this spot that it was thought advisable to perform paracentesis. After making an exploratory puncture with a grooved needle, a small trocar was introduced and 8 oz. of pus was drawn off; as the patient was very weak it was considered better not to remove any more on that day. The opening was therefore closed and dressed with carbolic acid ointment. He felt much relieved. Stimulants, beef tea &c., were administered as required. Next day, the 29th of March, he became suddenly worse in the afternoon, complaining of dyspnœa and great prostration. His features were pinched, his extremities cold, and his pulse almost imperceptible. He sank rapidly and died at 11 p.m.

Post-mortem appearances 9½ hours after death :—

*External Appearances.*—Body emaciated; cadaveric rigidity incomplete: small opening (where paracentesis thoracis was performed) on the left side of the chest, and in a straight line below the nipple.

*Internal Appearances.—Thorax,* a large quantity of pus in the left pleural cavity; several small openings (by ulceration) in the intercostal muscles between the 6th and 7th, and 7th and 8th ribs in a line passing down from the left nipple. Through these openings pus issued freely as the integument &c., was being reflected back.

*Heart* enlarged, weight 17 ounces: its surface covered with organized lymph, and adherent by bands of lymph to the pericardium. Its cavities contained clots of fibrin, and there was a long fibrinous clot in the pulmonary artery.

*Valves,* Normal.—Pericardium contained a large quantity of serum and was firmly adherent, by its external surface, to the left pleura and to the ribs anteriorily.

*Left Lung.*—Compressed into the upper part of the chest. It contained a quantity of frothy brownish serum but was crepitant throughout, except in its lower margin where it was congested and condensed.

A small portion of the inner surface of the 7th rib was denuded of periosteum, and in a carious condition close to the site of the cribriform openings through the intercostal muscles.

On the right side there were some old pleuritic adhesions.

The right lung was healthy.

*Abdomen.*—Liver mottled on its surface, weight 5 lbs. There was a deep cicatrix on the anterior surface of the right lobe, and near its lower margin. About an inch from the surface of the liver and opposite this cicatrix, there was an abscess about half the size of a walnut and containing thick white matter, almost of a cheesy consistence. The liver was somewhat congested but contained no other abscess. Gall bladder half full of bile.

*Kidneys.*—Left kidney enlarged and congested, weight 11½ oz.; right kidney in the same state, weight 8 oz.

### II. *Case of No.* 3,489, *Corporal W. Holland of H. M.* 45*th Regiment.*

A very weakly man. He arrived from Madras on the 9th June, 1870; was admitted to hospital on the 24th June suffering from dyspepsia and gastric irritability. A. Enteritis. B. Hepatic Abscess

Subsequently general abdominal tenderness with dysenteric diarrhœa, and symptoms of hepatic abscess set in. The latter were not very marked. The chief symptoms were those of intestinal inflammation and ulceration.

The treatment consisted of hot fomentations, turpentine stupes, blisters, &c. to the abdomen, ipecacuan in large and in small doses, chlorodyne, opium,

&c. Diet, wine, &c. He died on the 1st of August, after being 61 days in hospital. There were no head symptoms to attract attention during life.

Post-mortem appearances 16 hours after death:—

*External appearances.*—Body much emaciated.

*Internal appearances.*—*Head,* slight opacity of the arachnoid at the vertex. About an ounce of serous effusion at the base of the brain. Substance of the brain very pale, but dotted with an unusual number of vascular points. About half a drachm of fluid in each lateral ventricle.

*Thorax.*—A considerable quantity of serum effused in both pleural cavities, but no pleuritic adhesions on either side, except in the case of the base of the right lung being adherent to the diaphragm, and by it to the upper surface of the liver. Left lung healthy. Right lung pressed upwards by the liver, and adherent to the diaphragm and liver.

*Heart.*—Normal. Clot in right ventricle, valves healthy.

*Abdomen.*—Liver enlarged, weight 5 lb. 6½ oz., adherent by its upper surface to the diaphragm. Large abscess in the upper part of the right lobe, full of foul grumous pus, and the substance of the liver around it in a broken-down disorganized condition. There was also an abscess of considerable size in the left lobe and full of thick bright yellow pus. The substance of the liver generally was studded with small abscesses, varying in size from that of a pea to that of a hazel nut.

Gall bladder full; pancreas normal; spleen healthy, weight 3 oz. 1 dr.; omental peritoneum congested.

*Stomach.*—Adherent externally to the transverse colon by recent peritonitic inflammation. Slight congestion of the lining membrane of the stomach opposite the site of adhesion to the colon.

*Large Intestines.*—Colon slightly adherent to neighbouring parts in various portions of its course, owing to chronic peritonitis colon thickened, and its inner surface covered with large and small ulcers throughout, but chiefly from the ileo-cœcal valve to the termination of the transverse portion. About 5 oz. of yellow serous fluid in the peritoneal cavity.

No perforation of the colon.

*Small Intestines.*—Congested.

*Kidneys.*—Slightly congested.

### III. *Case of No.* 2,165, *Private Thomas Leech of H. M.* 21*st Regiment.*

Case of Dysentery.

A delicate, anæmic-looking man admitted into hospital on the 10th of August, 1870, two days after arrival from Burmah, *viâ* Poonamallee, suffering from severe dysentery which he contracted during the journey from Poonamallee to this place.

The ipecacuan treatment was tried but he could not bear it, and did not benefit by it. Repeated blisters, fomentations, &c., were applied over the abdomen, and he was found to be most benefited by dilute nitric acid with liquor morphia.

After a time he improved slightly, but subsequently he retrograded and no treatment had any beneficial effect since.

His stomach became so irritable latterly that he could retain neither food nor medicine. He gradually sank, and died on the 17th of September, 1870.

Post-mortem appearances 16 hours after death:—

*External Appearances.*—Body very much emaciated.

*Internal Appearances:*—

*Thorax.*—Slight pleuritic adhesions on right side. A small quantity of serous effusion in both pleural cavities.

Lungs and heart normal.

*Abdomen.*—Stomach distended with gas, duodenum also distended with gas. Omentum adherent to subjacent bowels. Intestines matted together from peritonitis. Colon (ascending and transverse portions) ulcerated, thickened, and gangrenous (no perforation).

Liver, weight 3¾ lbs.; an abscess of considerable size in the right lobe, other parts not examined.

IV. *Case of No.* 3,731, *Private John Richardson, of H. M.* 76*th Regiment.*

Aneurism of the Arch of the Aorta.

Death out of hospital 5th June, 1870 :—

This man was at his duty and had not been in hospital since December 1869. He had a weakly, anæmic look of late and complained of dyspepsia and flatulence. On the evening of his death he said to his wife that he felt sick and faint. He went into his bath-room, vomited, and then came out and fell down dead.

Post-mortem appearances 16 hours after death :—

*External appearances.*—Cadaveric rigidity complete. Post-mortem lividity of the back (under-surface of body) and extremities. No marks of injuries.

*Internal appearances* :—

*Head.*—Not examined.

*Thorax.*—Pericardium filled by a large clot of blood from an opening in an aneurismal sac on the arch of the aorta.

The sac was about the size of a hen's egg and had a thick fibrinous lining. There was a part of the sanguineous clot in the pericardium, that had an appearance as if effused some time ago.

There was also a quantity of clear serum in the pericardium.

*Lungs.*—Normal.

*Abdomen.*—Liver slightly enlarged. Other parts not examined.

V. *Case of No.* 3,902, *Private Andrew Gordon, of H. M.* 1*st Bn.* 21*st Regiment.*

Case of Phthisis Pulmonalis. Pulmonary Hæmorrhage

This man arrived at Wellington, from Kurrachee on the 27th January, 1870, suffering from debility, the result of fever.

He said he had a cough since November 1869. He was about 2 months in hospital here under treatment for debility, cough and diarrhœa. Latterly he was much better and was doing his duty. On the night of the 5th September, 1870, he went to his bed in barracks in his usual health : shortly afterwards he suddenly got up, vomited a large quantity of blood and died in a few seconds.

Post-mortem appearances 11 hours after death :—

*External appearances.*—Body thin and ill nourished. Rigor mortis complete.

*Internal appearances.*—Head, not examined.

*Thorax.*—Pleuræ of both lungs firmly adherent on both sides to the walls of the chest.

*Lungs.*—In the upper portion of the right lung there were several cavities filled with broken-down tubercle. The lower portion of the lung was slightly emphysematous, and gorged with blood. The apex of the left lung was quite cartilaginous in structure, and contained a large cavity filled with blood, and from which it is probable the fatal hæmorrhage took place. The lower portion of the lung was gorged with clotted blood.

*Heart.*—There was about 2 oz. of fluid in the pericardium. Heart small but healthy. Other parts not examined.

*Cause of death.*—Phthisis pulmonalis, immediate cause pulmonary hæmorrhage.

In conclusion I would observe that this Report has been hurriedly drawn up within the last few days, and while I was busy with other matters ; I trust therefore that its imperfections will be viewed with leniency.

*Wellington, January* 30*th*, 1871.

## APPENDIX No. XIII.

## A FEW REMARKS ON THE DISEASE FROM WHICH THE DETACHMENT, CEYLON RIFLES, STATIONED AT LABUAN, SUFFERED SO SEVERELY DURING THE YEAR 1869 AND PORTION OF 1870.

By Assistant-Surgeon Dr. BARRY, Ceylon Rifle Regiment.

*History of the Detachment.*—The detachment arrived in Labuan on the 11th December, 1868, all apparently in a good state of health, no case having been under treatment for several days before and after disembarkation on the island.

The first case entered as Intermittent Fever occurred on the 16th December, 1868, the only other fever case for that month was admitted on the 21st.

The average strength for the year 1869 was 160·25, the total admissions from all causes were 498, out of these 389 were for Intermittent and Remittent Fevers; but it must not be supposed that this represents anything like the actual number of cases that occurred, as very many light cases were treated as out-patients when the hospital was crowded, and not included in the returns. The number of deaths for 1869 was twelve, of these one was entered as having died from Remittent Fever and five from Intermittent Fever.

*The Disease.*—The disease at first presented all the ordinary characters of malarial fevers as usually described, but towards the latter part of 1869, as the men's constitutions became weakened by repeated attacks and lengthened exposure to malaria, the fever gradually began to assume a more asthenic form, the paroxysms apparently not so severe were less amenable to treatment, convalescence was slower, and the digestive functions were longer in recovering themselves, no cases however were complicated with dropsical swellings; at this period patients began to present themselves suffering from some symptoms of Beri-Beri, but it was not until January, 1870, over a year from the date of arrival on the island that the entire collection of symptoms which go to constitute this disease appeared.

Some of my predecessors at Labuan termed this disease Beri-Beri; others characterized it by the name of its various symptoms, for instance, I found that cases returned as Debility, Atrophy, Dropsy, Rheumatism, Asthma, Dyspepsia, and Intermittent Fever had frequently all the symptoms which go to make up Beri-Beri.

*Symptoms.*—The following is a brief description of the most prominent symptoms of the disease in its first stages.

A patient presents himself at hospital, feeling no longer able to perform his duty, or, perhaps, as frequently occurred, has been obliged to fall out on parade, he complains of general debility, of pains, weakness, and sometimes a feeling of weight and numbness, with slight œdema of lower extremities, of difficulty of breathing on slight exertion. He generally states that these symptoms come on after the last attack of fever, or that he at present suffers from slight fever every night. His countenance is frequently anxious, his general appearance is debilitated, in many cases there is marked anæmia. He walks with a shuffling unsteady gait. Pulse and heart's action weak, unless during a febrile paroxysm, and even then the former is compressible. Tongue often clean, at other times coated, sometimes indented at the sides from the teeth, appetite as a rule very bad, conjunctivæ frequently yellowish, bowels often constipated. Skin dry; urine frequently scanty and of low specific gravity.

It would be impossible to define any particular course which these symptoms

would take in the progress of the disease, in some they, more or less, rapidly proceed to a fatal termination, the urine decreases, general anasarca sets in, dyspnœa becomes more urgent, until death occurs from effusions into the spinal canal, lungs, &c. In more favourable cases there is partial recovery, the febrile paroxysms give way to quinine, the œdema entirely disappears, but the paralytic symptoms remain.

If sent out of the island in this condition complete recovery is the result, but from want of more frequent communication between Labuan and Singapore, I often, unfortunately, had not an opportunity of sending them away for six and seven weeks, and when a relapse of the dropsical symptoms took place death was invariably the result.

The following is a more detailed description of the most important symptoms together with a few words on their pathology.

*The Pains.*—The pains complained of are sometimes felt in the legs from the knees down or only in the knee or ankle joints, sometimes in the muscles of the forearm, or inside the chest; but the most frequent seat of pain is in the calves of the legs and tendo-achilles.

The pains are increased during a paroxysm of fever, also on pressure and motion, and are felt worst at night particularly during rains; in chronic cases they are often only present in wet weather, or during a febrile attack and are usually relieved by warmth, in many cases they come on regularly at a certain hour every night, or every other night, and are sometimes described by the patient as being all over the body as if he had been severely beaten; severe headache is also common. In but few cases is there tenderness of the spine either by percussion, pressure, or passing a hot sponge along the vertebræ.

*Numbness.*—The numbness is generally confined to the legs and forearms, but most frequently is felt only in the feet and hands, and sometimes it occurs periodically like the pains, and I have often prevented its recurrence by a large dose of quinine given three hours before its expected time, in a few cases only, was there general numbness of the body.

*Pathology of the Paralytic Symptoms.*—All the paralytic symptoms, such as pains, weakness, numbness, and feeling of weight of the lower extremities, together with the shuffling, unsteady gait which is so characteristic of the disease, can I think be fairly referred only to some changes in the lower part of the spinal canal. The congested state of the vessels of the membranes, or serous effusion into the substance of the cord and its connective areolar tissue or into the spaces external to, or between the membranes would be quite sufficient to account for all the paralytic symptoms. I do not think that they are indicative of inflammation because I have frequently known the pains and numbness to occur only periodically to be controlled by quinine, and to leave entirely as soon as the patient was removed from the island, pain in the back also was never well marked, and there was no case in which either opisthotonos, convulsions, retention or incontinence of urine or fæces occurred.

Various forms of deranged innervation and paralysis from other blood poisons besides malaria are well known, such as the palsy arising from the absorption of lead into the system, palsy from syphilis, paralysis from the use of the flour of the vetch known as the Lathyrus Sativus, not uncommon in some parts of India, the symptoms of which very much resemble the paralytic symptoms of Beri-Beri.

I am inclined to believe that the congestion of the membranes is a portion of the general internal congestion observed in cases of death from Beri-Beri which becomes chronic and localised in the membranes of the spinal cord, from the constant action of the malarial poison, and giving rise to the paralytic symptoms frequently observed in chronic cases. General internal congestion is also, I believe, one of the post-mortem appearances in deaths occurring during a paroxysm of malarial fever.

*Dyspnœa.*—This symptom sometimes comes on before the patient reports sick, though not then urgent, merely shortness of breath on slight exertion, sometimes coming on at night in paroxysms, and apparently not attended with any disease in the chest as stethoscopic signs are negative; it is probably due to deranged functional nervous influence. In severe cases, and as death approaches, dyspnœa becomes the most painful of all the symptoms, the patient is always obliged to be supported in a sitting posture in bed and his respiratory efforts

become most distressing. The great congestion of the lungs, easily detected by the stethoscope, and the effusion into the spinal canal causing pressure on the origin of the phrenic and intercostal nerves, as also the formation of clots in the heart, would be quite sufficient to account for this symptom.

*Urine.*—Is generally clear and slightly high coloured, usually scanty, becoming more so as death approaches; often of low specific gravity and normal acidity; more rarely alkaline of high specific gravity and accompanied with an abundant precipitate of phosphates; this condition is almost certainly followed by a fatal termination to the disease; sometimes high coloured acid reaction and high specific gravity accompanied occasionally with tenderness over the loins, never albuminous. Diuretics and dry cupping have not the slightest effect in increasing the urine, except in mild cases.

*Dropsical symptoms.*—Œdema of the lower extremities is frequently present in patients when they first come to hospital, sometimes confined to the feet, but oftener extending up as high as the middle of the leg, and readily detected by pressure on the inside of the tibia, or over any part of instep; in some cases it remains stationary for several weeks, often apparent only in the evening; in others it quickly becomes general over the body, the face and neck become bloated and dyspnœa is urgent, even in this state recovery occasionally takes place, but unless the patient be instantly removed from the island a relapse occurs which is always fatal.

The extent of the effusion generally bears a relation to the quantity of urine passed.

The causes of the effusions in Beri-Beri appear to me to be the following, viz:—

First, an attenuated state of the blood supervening upon repeated attacks of malarious fevers or constant exposure to malaria. Secondly, from the effects of the same poison on the sympathetic, and, perhaps, cerebro-spinal system of nerves, the coats of the capillary vessels which they supply become more or less paralysed and admit of the effusions of watery blood and serum into the tissues, spinal canal, lungs.

Thirdly, obstructed secretion of urine which is probably due to the same cause that gives rise to the paralytic symptoms, see cases 1 and 2, the urine became rapidly less towards the end, evidently when the effusion into the spinal canal had reached as high as the portion of the cord where the nerves of the kidneys are given off. Fourthly, want of absorption by the lymphatics, whose coats are, I presume, affected in the same manner as those of the arteries, for although nerves have not yet, I believe, been satisfactorily traced into them, they seem very sensible to electric stimuli. Lastly, some minor causes, such as want of action of the skin, a weak heart and general debility of the muscular system, all of which would assist in producing the effusions which proved so fatal.

*Cases.*—The following are abstracts of a few of the cases, the records of which I am at present in possession.

*Case* 1.—No. 276, Private Ami Cassim, Ceylon Rifle Regiment, age $26\frac{6}{12}$, service $8\frac{5}{12}$.

Arrived at Labuan on the 11th December, 1868, previous to which time he enjoyed good health; his medical history sheet presents the following:—

During his service in Ceylon, three admissions for Scabies,—Hong Kong, one for Varicella—Labuan; one each for Contusio, Scabies, and Ulcer, and six admissions for Intermittent Fever. His last illness is dated from the 22nd March, 1870, when he was admitted into hospital for Intermittent Fever which reduced his strength considerably, he was discharged to the "Convalescent "List" on the 4th April, and was re-admitted on the 6th, complaining of general debility, pains and weakness of his legs, loss of appetite, and of slight fever, which he described as commencing at a certain hour every night with shivering, and ending in heat and dryness of skin without perspiration, accompanied with headache and increased pains in his limbs, the whole lasting about two or three hours. His pulse was weak, tongue slightly foul and bowels costive. He got three v. gr. doses of quinine daily up to the 11th, when the febrile attacks ceased and his quinine was reduced to gr. v. every morning, together with a mixture containing arsenic and chlorate of potash in a bitter infusion three times a-day. He had similar pyrexial attacks on the 14th, 22nd, and 25th of April, and 1st and 4th May, complicated on two

occasions, with bilious vomiting, the other symptoms remaining pretty much the same; if anything the debility was increased. He had beer, sago, milk, &c., as extras, in addition to soup from his beef ration, but his appetite was so bad that he could take but little of anything.

On the 6th May I first noticed some œdema of the lower extremities; on being questioned he stated that his urine had been less than usual for a few days previously, I examined it and found that it was cloudy in appearance, very acid, specific gravity 1,022, and did not yield a precipitate with heat and nitric acid.

8th May œdema rapidly increasing, neck bloated, face puffy, urine about 10 ounces for last 24 hours, clear, beer colour, not so acid as on the 6th, sp. gr. 1,030, not albuminous. Bowels regular; says he had fever yesterday at 6 P.M. To get quinine gr. x v. at 3 P.M., with fowl, ½ pint milk, and port wine as extras.

9th May, feels a little better, appetite slightly improved, œdema stationary, urine 12 ounces for last 24 hours, beer colour, normal acidity, sp. gr. 1,028, nonalbuminous. The dyspnœa which was urgent yesterday is much less to-day.

11th May, does not feel quite so well, had a slight attack of fever during the night accompanied with shortness of breath; urine 12 ounces, beer colour, acid reaction sp. gr. 1,024, contains no albumen or bile; port wine increased to four ounces, and other medicines, and extras continued.

He gradually improved up to the 29th May, the œdema became less, his urine increased in quantity, he had no more fever but still complained of pains and weakness of legs, also numbness and feeling of weight about the calves; he had, however, pyrexial attacks on the nights of the 25th and 26th similar to those already described, except that the pains in his limbs were more severe.

A change in his urine was observed on the 27th, it was then $26\frac{2}{3}$ ounces for the previous 24 hours, turbid, yellow, slightly alkaline sp. gr. 1,017, not albuminous.

*His urine decreased daily, appetite became worse, his legs began to swell and pit on pressure, and on the 4th June his case is described as follows:*—He *is in a very similar state to what he was on the 8th May, except that his urine is now much smaller in quantity being only* $3\frac{1}{2}$ ounces for the last 24 hours; strongly alkaline, with a deep sediment which, when filtered and dried, was fine, almost white and appeared amorphous, not readily dissolved either by heat or in acid, sp. gr. 1,040.

Crepitation became abundant over both lungs, the dyspnœa increased, anasarca became general, pulse and heart's action weaker, skin cold and clammy, and he died on the 5th June, 1870.

*Autopsy* 18 *hours after death.*

*General Aspect.*—A stout, well formed, but bloated looking body, with fair muscular developement, a large heavy head set on a thick short neck, a broad and deep chest, belly naturally prominent and not lank as of a man long in hospital, presents more the appearance of the Indian than the Malay type of race; colour of skin very dark. Rigor mortis well marked, externally no trace of illness, except the general bloated appearance; marks of treatment over liver and spleen, serum running from the mouth. *Head*—Scalp thick; blood oozing at all points on section; calvarium readily detached, thick, no roughness nor dryness on the internal table.

*Dura mater* congested, adherent in the whole length of the superior longitudinal sinus and requiring a free use of the scalpel. At the base of the skull it was easily detached and had a swollen appearance. The sinuses at the base of the brain were all filled with dark fluid blood. The cellular tissue in the cavernous sinuses was unusually vascular, the small vessels seemed to declare themselves everywhere. On detaching the brain about three ounces of blood and serum escaped.

*Brain* and Membranes;—Over the left hemisphere the arachnoid was slightly opaque, and between the hemispheres there was a considerable amount of subarachnoid fluid, the vessels of the pia-mater appeared everywhere in a congested state.

On section the brain was firm and the blood spots above the corpus callosum increased in number.

The corpora striata, optic thalami and pons varolii all appeared healthy. The medulla oblonguta felt hard and firm. In each of the ventricles was a small quantity of bloody serum. The choroid plexuses were of a deep chocolate hue, each containing an oval body about the size of a pea, hard and gritty to feeling.

*Cerebellum* was vascular and softer than natural as was also the crura cerbelli.

*Spinal Canal and Cord.*—On turning the body to open the canal, a large quantity of blood clots and bloody serum issued and continued to run out until 16 ounces had been collected. On making a section through the skin and muscles of the back, a considerable amount of bloody serum exuded. At the back of the neck and about the base of the skull there was internal congestion almost amounting to effusion.

The space external to the dura mater was filled with clots of blood almost from end to end, and a quantity of bloody serum which had not escaped with the rest through the foramen magnum still remained, some of it probably was collected from the deep tissues around after the canal had been opened.

The vessels of the *dura mater* were congested and those of the *arachnoid* and *pia mater* more so the cord appeared healthy on section.

*Face, Neck, &c.*—Lips and gums livid; tongue foul, furred and flabby; clotted blood in the veins of the neck and in the veins of the back of the œsophagus; the glands at the base of the trachea were enlarged; the lining membrane of the trachea was dusky and that of the epiglottis congested.

*Thorax.*—On section of the pectoral muscles a large quantity of serum escaped.

*Pleura* on both sides free.

*Right Lung.*—Upper lobe crepitant, middle and lower lobes very much congested, most so at the lowest portions; on section a frothy serous-looking fluid becoming bloody towards the base of the lung, exuded.

*Left Lung.*—Both sides loaded with bloody frothy serum which escaped on section.

*Pericardium* contained three ounces of straw coloured fluid.

*Heart.*—The right ventricle was dilated and formed the apex of the heart, its muscular substance was attenuated and appeared fatty; under the microscope, oil globules were abundant; in the cavity of the ventricle was a large yellow clot extending through the auriculo-ventricular opening into the auricle, there was also a small dark clot in the ventricle.

The left ventricle was small and contracted, and filled by a clot of blood; fatty degeneration was apparent in its walls but not to such an extent as in those of the right ventricle.

*The Valves* of the heart were all perfect.

*Aorta* and pulmonary artery. The coats of these vessels appeared thinned.

*Abdomen.*—On section of the muscles a quantity of serum exuded.

*Peritoneum* had a purple hue and over the bladder was œdematous and adherent. Peritoneal fluid about three ounces.

*Stomach.*—The mucous membrane had a pigmentary appearance.

*Duodenum* was stained with biliary matters, the rest of the small intestine appeared healthy, with the exception of occasional patches of congestion.

*The large intestine* contained a quantity of fluid fæcal matters.

*The Liver* was of natural size, on section it presented several blackish chocolate-coloured patches; under the microscope, abundance of oil globules and pigmentary granules were visible.

*Gall bladder* was full of viscid dark bile.

*The Spleen* weighed 18½ ounces, its capsule peeled off readily, it was of firm consistence, and on pressure dark blood freely exuded.

*Kidneys* were healthy looking. All the connective areolar tissue of the abdomen was loaded with serum and had an emphysematous feel, crackling under the fingers.

*Case* 2.—No. 126, Private Packeer Samat, Ceylon Rifle Regiment, age 27, service 9 years.

*Previous Medical History.*—Enjoyed good health before he entered the Service; served in Ceylon and Hong Kong. His medical history sheet presents six admissions for ophthalmia and one each for contusio and varicella; states

that he never suffered from malarious fevers until he came to Labuan, since his arrival at this station he has been twice treated in hospital for intermittent fever.

*Present Condition.*—17th July, 1870. Came to hospital this morning complaining of having had fever for the last two nights, commencing at 6 P.M. with coldness of the body, followed by heat, and ending in perspiration at 3 A.M. His *pulse* was of fair volume, though compressible; heart's action weak; *bowels* not well opened; *tongue* slightly whitish, says he ate nothing for three days; also complains of pains and numbness of the legs from the knees down, these he states commenced with his present attack of fever and were felt most during the paroxysms; *gums* and inside of mouth and eyelids pale, anæmic looking, slight dullness over region of spleen, all other internal organs apparently healthy. There was no tenderness along spine, either by pressure, percussion, or passing a hot sponge. *Urine* plentiful, slightly high coloured but clear; of normal acidity; specific gravity 1,032; gave no precipitate with heat and nitric acid.

*Treatment.*—Quinine, and blister to region of spine.

*Evening visit.*—*Pulse* somewhat weaker than in the morning, states that he has not slept for three nights.

18*th July.*—States that he slept well up to 12 o'clock, then awoke and vomited three times; also that the fever commenced at 3 A.M. with a feeling of cold, followed by heat and ending in profuse perspiration at 5 A.M. I saw him at 6·45 A.M. when he had just eaten a rice-cake and drunk some coffee, both of which he soon after vomited. His countenance was anxious looking; pulse small and compressible; heart's action very weak; tongue rather foul, bowels were opened pretty freely during the night; crepitation and wheezing at the bases of both lungs are audible with the stethoscope, plainer at the back than front of chest.

*Urine*, only two ounces since yesterday and not so clear; of normal acidity and not albuminous.

The crepitation became rapidly diffused over the entire lungs. The difficulty of breathing and anxiety became more urgent; he was obliged to be supported in a sitting posture in bed; the heart's action became weaker, and all the symptoms rapidly becoming aggravated, he died at 4·30 P.M. not quite 36 hours from the time of his admission.

*Autopsy* 15 *hours after death.*

*General aspect.*—Moderate muscular development; rigor mortis well marked, a quantity of serous fluid was oozing from his mouth and nostrils; puffed bloated appearance of face and neck.

*Head.*—There was considerable congestion of scalp; calvarium detached with difficulty and healthy looking internally, all the membranes were intimately adherent to each other, and to the brain along the whole length of the upper surface of the hemispheres extending for about ¾ of an inch to the left and ½ an inch to the right of the longitudinal fissure.

On removing the brain a quantity of bloody serum was seen to issue from the spinal canal; the head and shoulders were then allowed to hang over the table, and the hips were raised so as to permit the fluid to flow from the canal; eight ounces of bloody serum was in this way collected; superficial cerebral veins were congested. *The arachnoid* and *pia mater* were healthy, except that the latter was slightly congested; subarachnoid fluid normal; brain substance healthy; a small quantity of fluid in the lateral ventricles; the others appeared empty; choroid plexus and velum interpositum natural; cerebellum pons varolii, and medulla oblongata, all appeared healthy.

*Spinal Canal.*—On making an incision from the occiput to the lower part of the sacrum, through the integuments and muscles along the spine, the parts at first appeared normal but in a short time serum began to collect at the bottom of the incision, being most abundant about the neck.

*Spinal Cord.*—There were blood clots throughout the entire length of the spinal canal external to the dura mater, the latter appeared healthy. Vessels of pia mater and arachnoid considerably congested; the cord itself presented a normal appearance.

*Thorax.*—Mucus membrane of epiglottis, larynx, and trachea congested; lower portion of trachea and bronchi filled with frothy mucus.

*Pleuræ* non-adherent.

*Lungs* greatly congested, more so towards their bases, a considerable quantity of frothy sero-sanguineous fluid exuded everywhere on section.

*Heart* normal in size; right auricle contained besides some dark fluid blood, a large clot which extended into the right ventricle, in the latter also was another larger and fibrinous looking clot, which sent a prolongation into the pulmonary artery; all the valves and openings of the right side were natural; walls of the right ventricle thinned and flabby, otherwise healthy looking.

*Left ventricle* formed apex of the heart; walls normal thickness, in its cavity were numerous, small, imperfectly formed dark clots of blood. The lining membrane near the semilunar opening and that portion covering the ventricular side of the valves was opaque. *Aorta* thinned and congested internally.

*Abdomen.*—Tongue much coated, all the connective areolar tissue about the pharynx and œsophagus infiltrated with serum, mucous membranes of pharynx and œsophagus healthy; of stomach congested; in the coats of the latter were to be seen numerous dark patches composed of congested veins filled with clotted blood, in the cavity of the stomach were water and other fluids drunk before death, also three round worms alive. Mucous membrane of small intestine congested in several places, four round worms were found in this gut, also alive. There was a quantity of fluid fæcal matter in the large intestine, its mucous membrane presented a healthy appearance.

*Liver* normal in size, on section it appeared much congested and of a *chocolate* colour.

*Spleen* weighed 17¼ ounces, was much congested and softened, breaking down readily on pressure.

*Kidneys* natural in size and congested on section.

*Bladder* was contracted and contained about ½ an ounce of urine.

All the connective areolar tissue of the cavity of the abdomen was more or less infiltrated with serum.

*Case* 3.—No. 3373, Private Assen Jamil, Ceylon Rifle Regiment, age 38, service 20 years.

During his service in Ceylon was 10 times admitted into hospital for febris intermittens, twice for ophthalmia and once each for the following diseases: vulnus, incisum, orchitis (N.G.), gonorrhœa, phlegmon, dysentery, abscess. When at Labuan he frequently suffered from attacks of fever, for which he was treated as an out patient, on account of the attacks not having been severe and the facility of treating him as he was Hospital Orderly to the detachment. On one occasion he was obliged to be admitted for an attack of intermittent fever of more than ordinary severity. His last admission at Labuan was on the 4th August, 1870 for remittent fever of a severe type. The remission for several days was hardly perceptible and lasted for only half an hour each time; however, advantage was taken of giving large doses of quinine during these short remissions and, apparently, with good result, as the paroxysms lessened in duration and severity, and at length ceased, but he was left in a state of extreme prostration. At this period symptoms of Beri-Beri began to show themselves; his legs and hands became œdematous, the former pitting deeply on pressure, he lost courage, and for more than a week was firmly convinced that he was going to die. His legs became painful and numbed, hands also numbed, he lost all feeling in his fingers. His breathing became hurried but his chest sounds were normal.

There was no tenderness along the spine, urine scanty, skin moist every night for a couple of hours. At the commencement of these symptoms he was treated with preparations of iron in combination with vegetable tonics, and a blister was applied to the spine; at the same time that his strength was supported by strong soups and wine. This treatment was apparently attended with the best results, the dropsy disappeared.

At this period, the *29th August*, he left Labuan with the rest of the detachment for Ceylon. When he embarked he was still in a very weak state but improved considerably on the voyage.

He arrived in Colombo on the *16th September*, 1870, and his symptoms at

that time were the following:—Considerable general debility; legs almost completely paralysed and numbed from the knees down, hands also numbed with almost complete loss of sensation in them, although he could move his fingers pretty freely.

On *October 15th* numbness had left both hands and legs, and he complained only of pain and feeling of weight in the calves of the legs. *1st November* could walk but with a shuffling gait, improved steadily every day. *14th December*, 1870, discharged to the Convalescent List.

*Case* 4.—Lieutenant Taylor, Ceylon Rifle Regiment, age 33, Service 9 years, all spent in Ceylon and Labuan.

In 1863, while serving in Ceylon, he suffered from an attack of remittent fever, after which he got dysentery and was invalided home; when at home he suffered from symptoms of acute hepatitis.

Arrived at Labuan on the 11th December, 1868, apparently in a good state of health. During 1869 he suffered from frequent attacks of intermittent fever, most of them being mild, during and after which he always experienced a dull heavy feeling in his right side; for a month prior to his departure from Labuan he got frequent mild pyrexial attacks and other premonitory symptoms of Beri-Beri, such as pains in his legs.

The dull heavy feel in his side having become constant I suspected abscess of the liver, and this, in conjunction with the symptoms of Beri-Beri, led me to recommend his being sent by the first opportunity to Singapore to appear before a Medical Board. He was sent, and the Board invalided him home. After he left Labuan, and up to January, 1871, he still complained of pains and numbness of the limbs, which symptoms, however, were going away. He lived generously at Labuan and drank filtered well water.

I regret that I am unable to furnish fuller statistics, as I am not at present in possession of them, the following, however, will give an idea of the mortality and invaliding.

*Mortality and Invaliding for* 1870.—The strength of the detachment on 1st January, 1870, was *154*, the *total* number of admissions into hospital from that time up to the *26th August* was *203*, out of this number 28 died, nearly all from *Beri-Beri*; although their deaths were chiefly returned under the heads of the primary diseases (Remittent and Intermittent Fevers). There were 54 men invalided for the same diseases, 7 of whom died of Beri-Beri on the voyage; but not a single death occurred amongst those who reached Ceylon.

The women and children enjoyed a comparative immunity from both fever and Beri-Beri, one woman and three children died in 1869, and one woman and 5 children in 1870. The latter woman died of Beri-Beri and the children chiefly from fever; but before leaving the island a great many women began to suffer from symptoms of this disease. As *they* spent all their time in barracks, the mortality amongst the men can hardly be attributed to any cause in the immediate vicinity of the Lines; because, of course, the duties of the soldiers kept them constantly away.

*Causes of the Disease.*—The cause of the mortality, was, according to one Medical Officer, to be solely accounted for by on insufficient meat diet and excessive duty in a climate where good and generous diet is indispensable with severe duties.

It has been attributed to another cause also, namely, that it was imported from Ceylon latent in the men's constitutions, and developed by the use of narcotics, particularly opium smoking.

I shall briefly refer to these causes and then add what I consider the mortality can most reasonably be attributed to.

*Diet.*—The diet which the men received at Labuan was exactly similar to that which they were accustomed to in Ceylon, and at the latter station Beri-Beri has been for a long time unknown among the troops, this fact alone is, I think, quite sufficient to exclude food from the actual causes of the disease; moreover, ¼ lb. of beef daily per man was issued in February, 1870, and increased to 20 ounces in June, yet it did not check the disease nor prevent an increase in the number of fever and Beri-Beri cases in July and August, when the unhealthy season had set in, and when there was a corresponding increase of malarious fevers among the civil population.

The best diet that could be obtained, men got while in hospital and when

patients who were receiving wine, porter, fowls, &c., and yet getting worse, were sent to sea, they almost invariably began to improve notwithstanding that all extras as well as their ration of beef were stopped.

Lieutenant Taylor's case,—a European officer who lived well, ate meat two or three times a day, and yet got Beri-Beri after he had been repeatedly attacked by fever,—would likewise, I am of opinion, tend to disprove this idea.

In conclusion the detachment of Ceylon Rifles now serving at Labuan got 20 ounces of fresh beef daily from the date of their arrival, and yet the disease continued.

*Duties.*—The duties were much too heavy; only an average of about three and four nights in bed for 1869, and even less in 1870. This, of course, was highly injurious, and was, I believe the chief predisposing cause to the disease, for loss of rest predisposes to malaria, and malaria, as everybody is aware, is most active at night. The duties of the Ceylon Rifles have often been quite as heavy in Ceylon, but did not produce the same effect; for the year 1870 the men had only three and four nights in bed at Head-Quarters and yet the health of the regiment was exceedingly satisfactory in Colombo for that year. We must, therefore, I think look for some more powerful cause than an insufficient meat diet and excessive duty, for these combined in a healthy climate would not produce fever and Beri-Beri.

*Imported from Ceylon and developed by the use of narcotics, particularly opium smoking.*—That this disease was not imported is, I think, pretty evident from what I have already said, namely, that Beri-Beri has for a long time been unknown amongst the troops serving there, and that none of the invalids sent to Ceylon died after reaching that station.

The second cause appears to me as untenable, because opium is so dear at Labuan that the men could not possibly afford to buy a sufficient quantity to injure themselves with it.

*Water.*—Water is frequently assigned as a cause of malarious fevers as well as of Beri-Beri, but the women and children of the detachment drank from the same wells as the soldiers, except those men doing duty on the gaol guard, who made use of a well close by the gaol, this water, however, was also drunk by the patients of the civil hospital and the different people around and never was known to produce any ill effects. The wells at the Lines are deep and surface water does not drain into them, moreover filters were procured, iron nails placed in them, and charcoal boxes put into the wells, but none of these measures checked either the continuance of the fever or Beri-Beri.

*Scurvy.*—From the livid appearance of the gums which were observed in several cases of Beri-Beri, it might strike some people that scurvy had something to say to the disease. I fully satisfied myself on this point. For several months I gave every man in hospital the juice of two fresh limes daily, and told the men at Surgeon's Inspection on Sundays to eat quantities of fruit and vegetables, which I have no doubt they did. I also found all antiscorbutic remedies useless, and there were none of the other characteristic symptoms of scurvy present.

It will be necessary here for me to say a few words about the sanitary state of the island.

*Drainage and Clearing of Jungle.*—Considerable attention was paid to the drainage and clearing of jungle on the island for several years after it was first colonized, and convict and civil labour was constantly employed for this purpose. A great deal was done by this means, and it was found that the fever, at first most deadly, gradually assumed a milder type, but that when these measures were neglected, the prevalence and severity of the fever again increased. I beg to add an extract from Dr. Cooper's able report on the island, which relates to to this matter.

"Everywhere the secondary jungle was springing up, the old stumps and "trunks of trees left in the ground previously began to decay, drains gradually "silted up and in sandy districts fell in, and the very natural result of all this "was that increase in the prevalence and virulence of the fever which shows "itself on the face of the return."

The drainage of the island was never considered anything like perfect, but since 1865 I believe that it has been almost entirely neglected. The old drains have silted up and most of them become utterly useless. That they are in this

condition, the officers who were with the detachment and are now in Ceylon, as well as those at present serving in Labuan, are aware.

From the following table there would appear to have been an annual increase in the number of fever cases among the troops at Labuan since the year 1864. The year 1868 is an exception, and that I attribute to the unusually small rainfall 127·50 inches. In 1869 there were 182·5 inches.

| Year. | 1864. | 1865. | 1866. | 1867. | 1868. | 1869. |
|---|---|---|---|---|---|---|
| Corps. | 34th Regiment, N. I. | 34th & 35th Regiment, N. I. | 35th & 8th Regiment, N. I. | 8th Regiment, N. I. | 8th & 7th Regiment, N. I. | Ceylon Rifle Regiment. |
| Average Annual Strength ... | 146·75 | 170 | 161 | 165 | 155 | 160·25 |
| Fevers treated in Hospital ... ... | 93 | 185 | 362 | 458 | 184 | 389 |

The mortality amongst the Ceylon Rifles was attributed to everything that could well be thought of except malaria; but the following facts seem to me to point conclusively to that poison as the true origin of the disease:—

*First.*—The exceedingly swampy state of the island, and the great prevalence of fever amongst all classes.

*Secondly:*—The history of the detachment which, as I before mentioned, arrived at Labuan in a good state of health, and suffered severely for a year from malarious fevers before Beri-Beri became manifest.

*Thirdly.*—The post-mortem appearances observed in cases 1 and 2, among which may be noticed the general internal congestion, the chocolate appearance of the liver, and the enlarged spleen.

*Fourthly.*—The exact resemblance of the pyrexia accompanying Beri-Beri, to the asthenic form the fever had assumed, many cases of which presented none of the symptoms of Beri-Beri.

*Fifthly.*—The unmistakeable way in which the disease was often to be traced directly to an attack of fever.

*Lastly.*—I find, on careful perusal of all the records that had been kept at the station since Labuan was first garrisoned, that every case of Beri-Beri had begun with malarial fever, or had been in hospital a short time previously with fever, in most cases had suffered from it repeatedly, and the symptoms of one gradually emerged into or occurred with the other.

Supposing that all the cases of Beri-Beri could be explained away, there still remain the far more numerous cases of malarious fevers to be accounted for.

When the swampy state of the island is considered, and the prevalence of these diseases and their fatality since the first foundation of the settlement in 1848 is remembered, it seems needless indeed to attempt to prove that the drainage of the island is perfect, or that fever and its undoubted sequelæ can be attributed to any other cause than the malaria arising from the numerous swamps.

*Treatment.*—It would take too long to describe the numerous modes of treatment that were adopted during the epidemic of Beri-Beri, all of which were tried with such fruitless results. I shall, therefore, only briefly mention what appeared to have been the most useful remedies.

Arrowroot, nourishing broths, sago, &c., stimulants, such as port wine, brandy and beer. Large doses of quinine with chlorate of potash until the febrile symptoms disappeared. I often gave as much as xx qrs. of quinine every day for a fortnight with apparent benefit and without producing chinonism. Liquor ferri pernitratis in ʒi doses three times a day was the most effectual remedy in checking the dropsical effusions. The oleum nigrum I found perfectly useless in producing its supposed stimulant and diaphoretic effects. Very little benefit was derived from diuretics diaphoretic, hot air or hot water baths.

*General Summary and Recommendations.*—It may be considered remarkable that the *civil populations* do not suffer so severely as the troops. I may, however, state that no statistics have been kept with regard to the general population and nothing is known of their sanitary state. I believe that 40 deaths from fever alone were returned to the police during the year 1869, but it can hardly be supposed that this represents anything like the entire mortality, as the natives in the jungle, and in the remote villages, hold little or no communication with the civilized portion of the island, which is confined to each end of Labuan.

The statistics of the *civil hospital* do not prove anything, because when natives get fever they do not go there, except, perhaps, some of the coal miners and a few of the servants of the officers of the Colonial Government. I believe that most of the inhabitants of the island are not aware of the existence of such an institution. The chief classes treated there are Chinamen with obstinate ulcers.

The population was estimated for 1869 as between 3,000 and 4,000, mostly a floating population, constantly passing to and from Borneo and Singapore: the remainder are acclimatized individuals who remain after having been weeded out by fever and its sequelæ.

It is well known that natives of Singapore and Borneo, both of which places possess a very similar climate to that of Labuan, stand the climate of the latter better than natives of India or China. Coolies who were sent to Labuan from Hong Kong some years ago suffered from a mortality stated to have been caused by malarious fevers, at least, equal to that which destroyed the Ceylon Rifles.

*The civil population* do not suffer so much as the Ceylon Rifles in consequence of their not being so often exposed at night to malaria, and they have every night in bed. For the same reasons the *convicts* enjoyed a greater immunity; they also take more regular exercise, are frequently changing about; they go to Coal Point, which is at the other end of the island, to load steamers, &c.; they have no opportunities of debauch; they are, as a rule, stronger men than our soldiers; and something may be due to their having arrived from Singapore. A high wall also surrounds the gaol, and, I think, with the colonial Surgeon that it affords some protection from malaria.

The convicts, however, suffer severely from fever, for in 1869 we find 248 admissions, and one death from that disease alone, out of a strength of 130, but there were also 122 admissions and 4 deaths from all other diseases, and the colonial Surgeon informed me that these were mostly sequelæ of fever.

The *women and children* of the detachment suffered less than the men, obviously because they were not exposed at night in the open air to malaria, and they had every night in bed.

It may also be asked why the Ceylon Rifles suffered more than the troops who previously garrisoned the island.

*Mortality of Marines.*—A detachment of 31 marines were the first troops who did duty at Labuan, and I will add an extract from Dr. Cooper's report which relates to them.

"A monument in the graveyard records the names of 13 buried there out "of the 31 men in a period of about five months, and I have been told that every "one of the remaining men were within a short period invalided out of the "Service from the effects of disease contracted in Labuan.

The health of the troops, as I previously mentioned, improved with the progress made in drainage and clearing the jungle, and fell off when these measures were neglected.

The falling off since 1864 I can only attribute to insufficient attention to these measures.

I have no doubt that, had not those detachments which suffered from fever as severely as the Ceylon Rifles, been relieved annually, Beri-Beri would also have been fatal amongst them. I observed, on looking over the case books, that a considerable number of the fever cases began to present a few, and many, all the symptoms of Beri-Beri, when the detachments had been on the station about a year. The disease might not have attacked them so generally as it did the Ceylon Rifles, because it is as well known that some races suffer more from Beri-Beri than others, as it is that malaria acts more or less powerfully on different classes of individuals.

Something also may be due to the fact that the Indian troops were previously stationed at the "Straits" and the similarity of the climate to that of Labuan may have prepared their constitution for the latter.

In conclusion, I trust I may be permitted to suggest such propositions as may have occurred to me as likely to be beneficial to any troops that may hereafter be sent to Labuan.

As before stated, the detachment of Ceylon Rifles now serving at that station, are suffering from malarious fevers and Beri-Beri, notwithstanding that their diet is faultless, and the duties less than at head-quarters.

I would, therefore, beg to suggest that the remaining and most obvious cause of the disease "Malaria" be removed, or rather mitigated, by greatly increasing the drainage, or, at least, by rendering efficient that which is already in existence, especially on the extensive swampy place between the town of Victoria and the rising ground on which the barracks are situated. It would be impossible, except at an enormous expense, to thoroughly drain the island, but when the good results attending, even a moderate amount of drainage and clearing away of jungle are remembered, it would be well, I think, to give this subject especial attention.

The next most important improvement would be the establishment of a sanitarium on the small island of Pappan, which is situated upon it, a mile from the nearest point of Labuan.

From its general features, I should say, that it is entirely free from malaria, except any that could be wafted from Labuan, or the neighbouring coast of Borneo, both of which are at a considerable distance.

Troops ought not to be sent direct from India, China, or Ceylon, but should be for some time previously quartered at Singapore.

They ought to be sent so as to arrive about the 1st February, because the dry season, as a rule, sets in about the 1st January, and the swamps have had time to dry up. The detachments ought to be relieved annually, and every man should be invalided who has suffered from three or four attacks of fever, unless he has a strong constitution. Middle aged men seem to stand the climate best. A new hospital would require to be built, larger, well raised off the ground, and with free ventilation underneath. If native troops, the men ought to receive a daily meat ration long before they reach the island. A cup of coffee to each man when going on sentry would, I think, be desirable.

It would be superfluous for me to mention any of the other ordinary sanitary arrangements which are carried out at every station. I shall, therefore, conclude with an apology for the great length my remarks have attained, and for the want of more statistical evidence which I am not now able to furnish.

I beg it may be understood that in these remarks I do not pretend to describe the disease Beri-Beri, generally, but only as it appeared amongst the detachment with which I served in 1869 and part of 1870.

## APPENDIX No. XIV.

# ON ENDEMIC HÆMATURIA OF THE CAPE OF GOOD HOPE AND NATAL.

By Robert Batho, Staff Assistant-Surgeon.

At a meeting of the Association of Medical Officers of Health of London, the proceedings of which are detailed in the "Lancet," of February 4, 1871, the results are recorded of some very interesting observations by Dr. Cobbold, on the development of the larva of bilharzia hæmatobia in water containing ewage in a high degree of dilution. From these it would appear that the trematodes attain their larval stage prior to reaching "their ultimate destination in the bodies of mankind or monkeys."

The remarks above alluded to are summarized so briefly that I am left in doubt whether Dr. C. believes that it is as a larva that the parasite is introduced, or merely that he has artificially forced it to hatch from the ovum during the course of his experiments. From the analogy of other parasites, we should expect the bilharzia to advance one stage, at least, in its development during its temporary residence in the urinary tract; but from actual observation, this does not appear to be invariably the case. The ova and embryos are found in immense numbers in the urine; but, as far as I am aware, no higher stage than the embryo has yet been detected in the urine at the Cape, so that it is a mere matter of conjecture whether or not the fully developed trematode is a denizen of the human body in this disease. It seems highly probable that it is so, as the ova are present in the urine long after removal from the affecting focus; but on the other hand, if the fluke be present, there is great difficulty in accounting for the invariably spontaneous subsidence of the disease in the manner which will presently be mentioned. The fluke is known to infest various molluscs of the South African rivers, and as there is no system of drainage at the principal towns (except Algoa Bay or Port Elizabeth) where the disease is endemic, by which the ova which have been filtered through the urinary tract, could be reconducted to the rivers, it would appear that all such ova or embryos must invariably perish in cesspools and elsewhere, and that the continuance of the bilharzia species cannot be dependent on the chance of their ultimately finding a resting place in the molluscs.

During an eight years' residence at the Cape, with every station of which I am familiar, I have resided in the infested localities, and I have made very many inquiries, and some observations on this disease, the result of which I will embody as briefly as possible, premising that it must be regarded rather as one of the curiosities of pathology than as an affection of much gravity or importance. Like flies in amber, the chief interest that attaches to the bilharziæ in the bladder is how "the * * they got there." Various accounts have been published, throwing some light on the affection, but there is much still wanting to complete a knowledge of it.

I was first introduced to the bilharzia under the microscope six years ago, by that talented and scientific physician, the late Dr. Rubidge, of Port Elizabeth, and from observations then made, I have hitherto believed that the parasite entered the circulation as an ovum, and was, as it were, filtered through some portion of the urinary tract (chiefly kidney and prostate) either as an embryo or an ovum ripe for hatching. This, I believe, was Dr. Rubidge's opinion, and I think I am correct in saying that he did not regard the developed trematode as a human parasite at the Cape. (I am not of course ignorant of the

severe lesions connected with the bilharzia described by Dr. Aitken as prevailing in Egypt, &c.)

Hæmaturia is extremely common at Port Elizabeth and Uitenhage (a small town about 20 miles from Algoa Bay) and also in Natal; in fact, in those localities it is endemic. Sparse cases may also be observed in other parts of the colonies, but these are probably traceable to one or other of the infected localities. A certain propinquity to the seaboard appears to be a necessary element in its etiology.

This has not been explained, but it would appear probable that the mollusc in which the trematode is parasitic, is more plentiful in the tidal portion of the rivers. The limiting distance has not been defined, it is, apparently, under a hundred miles. At Port Elizabeth the disease, as before stated, is common; at Grahamstown, a distance of 80 miles, it is rare. This, probably, depends on the absence of a river at the latter town. In Natal it prevails along the coast, and at Pietermaritzburg (55 miles inland), and probably at greater distance within the specified limits.

In Natal the hæmaturia is very prevalent, large numbers of boys being affected. At the capital, Pietermaritzburg, it would appear as if the majority of the male youth suffer from it. It commences to show itself almost invariably before puberty, and never attacks persons of middle or old age. The limits of age during which its existence is possible are apparently from 5 years to 30. I have myself treated one case (a civilian, long resident in Natal) in whom the first symptoms appeared at 27, but this must be regarded as a most exceptional case, and at that date (1866) I was unable to hear of a single instance in which it commenced at a later age.

Its subjects are invariably of the male sex. Hæmaturia from other causes, is observed in the females at the Cape, as elsewhere; but after very many inquiries, I have not been informed of one case in which the characteristic symptoms were present or the ova or embryos detected.

Commencing in childhood or adolescence, the hæmaturia persists in spite of any treatment yet discovered until puberty, when (or shortly afterwards), as a rule, it spontaneously disappears and does not return. This subsidence at puberty is not invariable, but in all cases the bilharzia does not remain beyond the period above defined. The gentleman who was the first example of the disease examined in England, with whom I am intimately acquainted, was subjected to a variety of treatment and experiments, both at the Cape and in London, but without deriving the slightest benefit from the remedies, and he then gave up all medicines, and went for a pleasure trip to China and Japan, and on the voyage the disease left him. He was, in fact, approaching the limiting age about that time.

In Natal, Europeans and Zulus are equally liable to hæmaturia, and as before mentioned, dogs suffer, not infrequently. Generally, the urine in which the bilharziæ are found, is normal, save for their presence, and the admixture of blood. Urinary deposits are rare, and their existence is a mere coincidence. I have been informed by Dr. Dunsterville of a case in which renal calculi were passed with the usual symptoms, hæmaturia co-existing. They were of the mulberry variety, and on examination their nuclei were found to be made up of bilharzia ova-shells. This occurred at Port Elizabeth, which, probably, is the only town in the Eastern Province in which cases of gravel or calculus are at all frequent. During an eight years' residence at the Cape only two cases of stone (one an officer and one a child) came under my own cognizance.

The symptoms of endemic hæmaturia are as follows:—The boy observes streaks of blood tinging the last few drops of his urine, the flow up to this point having been quite clear. Sometimes a small hæmorrhage follows the evacuation of the bladder. This is, perhaps, attended with a slight itching or tingling sensation at the neck of the bladder (referred to *glans penis*), but with little or no pain. Each time micturition is performed the same phenomena occur. A gleety discharge may or may not co-exist, and an evacuation of prostatic fluid sometimes follows half an hour after the urine has been voided. The hæmorrhage is inconsiderable, never exceeding a few drachms, and in many cases its loss continues for years without any visible effect on the health. The patient is, possibly, somewhat etiolated, and, now and then, a train of nervous symptoms is induced, rather mental than bodily. As recovery commences, the flow of blood diminishes, till eventually it disappears; the embryos of the

blood fluke, however, can be detected in the urine for some time after all trace of blood has been lost. Dr. Hyde, of Durban, informs me that they have been discovered in a few instances in urine which had at no time contained blood.

Endemic hæmaturia is no new disease, but has apparently been known since our first occupation of the South African Colonies. I have ascertained from old colonists that they were perfectly familiar with it as boys at school, never attaching the least importance to it, and always believing it to be connected with the rivers in which they bathed. The seat of the disease, in the majority of cases, would appear to be the prostatic veins, or neck of bladder. Sometimes it is in the kidney, or perhaps in any portion of the urinary tract.

With regard to etiology sewage contaminating drinking water is almost impossible. At Port Elizabeth the sewage runs into the sea, and the water used for drinking purposes is almost invariably rain water stored in tanks. There are two rivers at Port Elizabeth, the Shark's river and Baaken river, and water from both is distributed by pipes to the houses for domestic uses, but is scarcely fit to drink. At Durban, Natal, where the disease is very common, every house is provided with tanks for rain water. At Pietermaritzburg rain water is also used, and the town is plentifully supplied with water from a mountain stream which runs in open channel through the streets. This mode of water supply is common in many of the Cape towns where, however, hæmaturia is unknown. Bathing at the Cape is by no means confined to boys, their exclusive liability to the disease remains, therefore, at present unexplained.

With regard to treatment, almost the entire list of drugs in the Pharmacopœia appears to have been put under contribution, but without much success. Pareira, bucku (a great native remedy in special favour with the colonists for a variety of ailments) uva ursi, perchloride of iron, turpentine, tannin, &c., have all been tried and found useless. The actual hæmorrhage is, perhaps, lessened, but the parasite remains. Probably, santonine, or some similar parasiticide, may eventually prove of service, but at present our only hope, and that a certain one, is to remove the patient from the infecting focus, when, after a time the disease will spontaneously subside.

With regard to *post mortem* appearances nothing is known; the affection is never fatal, and it occurs at an age when, in the healthy climate of the Cape, few other maladies prove fatal.

P.S. Since penning the above my attention has been directed to an article on the same subject, by Dr. John Harley of London, in the "Lancet," of December 3rd, 1870. The auther describes a kind of boil said to be prevalent in the affected districts. What this can be I am certainly at a loss to know. At Port Elizabeth no such affection is at all more common than in England. Along the seaboard of Natal, an affection of the skin called, in ordinary parlence "Natal sores," is extremely common, but etiology is perfectly well known. Every little patch of grass, and even the sand itself, is infested with myriads of a minute kind of Tick, so that in merely crossing in the most hurried way, it is impossible to avoid contracting a multitude of these little pests, which immediately commence their depredations on the skin with such voracity that their heads are completely buried beneath the cuticle. Unless detached by covering them with a drop of oil, the head is apt to be left behind, and on decomposing it becomes a minute centre of septic poisoning, giving rise to an inflamed areola, rapid suppuration, and eventually a troublesome sore. The resulting sores are well known in the colonies, and new comers are particularly susceptible. It would be impossible to connect such sores, which are common at all ages, and with both sexes, in any way with the hæmaturia above described. This is the only form of boil or ulcer prevalent in the country; save that in common with all hot climates having an atmosphere surcharged with moisture, any abrasion of the skin is apt to form the *t de départ* of ulceration, often of a troublesome description and difficul o heal.

With regard to the topical medication of the bladder, suggested by Dr. Harley, I am of opinion that it is required in very few cases, and would be submitted to by fewer, and that it would, in our present knowledge of the disease, be well to wait until it is found that tunnels in the mucous membranes exist before applying somewhat heroic remedies for their relief.

## APPENDIX No. XV.

### CASES.

1. *Case of Transplanting of small pieces of Skin to a large Ulcer. By Surgeon R. Wolseley, 5th Fusiliers.*

Although the following case, extracted from the Case Book of 2nd Battalion 5th Fusiliers, is one of but partial success, I think it advisable to record it, as from what I have seen of this new system in this case, I am led to believe that in a short time it will be much more frequently practised.

A very noticeable point in this case (and in others that have been published) is that not only was the healing process set up at the site where the new skin was planted, but that the general health of the sore (if I may so express myself) became improved, and all round the edge of the ulcerated patch the creeping inwards of the thin skin became more active, even before the appearance of the little island of skin in the centre. Before proceeding with the case, I had better state that the small pieces of skin transplanted were taken from the upper part of back by pinching up the skin with small pointed forceps and cutting it across.

Private J. C., 2nd Battalion 5th Fusiliers, aged 18 years, service 11 months, admitted with fever (which soon proved itself to be enteric) on the 26th August, 1870, under charge of Staff Surgeon C. Martin.

From the first the disease was accompanied with such extreme depression that stimulants had to be resorted to on the fourth day.

On the 13th day of the fever the Case Book shows that the pulse was "130, very feeble," and that there was "muttering delirium and little sleep"; all evacuations were passed involuntarily, and notwithstanding the utmost endeavours to avoid bed sores by means of air cushions, constant changing of bedclothes, painting with sol. gutta percha, &c., a large sloughing sore formed over sacrum, and on the 20th September it is stated in the Case Book that "a "large slough, some 4 inches by 3 inches," came away, and the next day the case was apparently considered hopeless, as the entry is "is sinking."

The case however, carefully watched day and night by Dr. Martin, progressed favourably, and on my joining the regiment the 27th September, the large sore though still sloughing was, I was told, looking more healthy, but still from its extent neither of us anticipated a favourable termination, as we thought that such extensive reparation as was required could hardly be obtained in a subject who then could not turn in his bed, who still continued to pass evacuations involuntarily, who had another bed sore appearing on hip, and who was actually but just kept alive by the administration daily of an enormous amount of stimulants. The case still progressed more favourably than was expected, and a month after my return the sloughing sores had assumed a healthy aspect; the largest, that over the sacrum, measuring about 4 inches by four inches, disharged quantities of healthy pus, and had been treated for a long time with linseed meal poultices and carbolic oil. Dry lint in the centre

and strips of simple dressing was substituted when the sore presented the appearance of a large ulcerated patch granulating healthily.

From the extent of the ulcer, the entire skinning over of it appeared hopeless. Day by day looking at it, and trying to believe that it was getting smaller was tiring to the attendants as well as to the patient.

The following extracts from the Case Book will conclude the case :—

*Nov.* 30.—"Large ulcerated patch about 4 square inches, remains over "sacrum. Two small pieces of skin to-day transplanted, and fastened down "with sticking plaster."

*Dec.* 1 *to* 6.—"The sticking plaster removed on the 3rd. No result at "present appears consequent upon the transplanting."

*Dec.* 17 *to* 20.—"Sore on back healing slowly. His general health is very "good. He is increasing in flesh very much; in fact, is stouter than he ever "was before."

*Dec.* 21.—"On examining sore on back to-day a minute point of skin appears "to be forming at the spot where such was transplanted on 30th November, "a little island, which I hope will increase in size. Granulations to-day "touched lightly wich sulph. cupri."

*Dec.* 30.—"The size of the sore has very much decreased, and the patch of "skin which formed in the centre has gone on steadily enlarging. The healing "process appeared to be greatly stimulated all round the edges from the time "the little island of skin appeared in the centre, and I have now no doubt but "that it will soon be entirely healed.

"It having been ascertained that his family are in a good position and able "to afford him the necessary care, he has been recommended for two months' "furlough, and will leave to-morrow for Coventry."

*February 28th,* 1871.—He returned from furlough to-day with the ulcer entirely healed.

2. *Tincture of Aconite in Pneumonia. By Surgeon R. Wolseley, 5th Fusiliers.*

The following case of double pneumonia, extracted from the Case Book of the 2nd Battalion 5th Fusiliers was one of unusual severity. The marked alleviation of the distressing dyspnœa and orthopnœa by the tinct. of aconite induces me to draw special attention to it.

I was induced to resort to this powerful medicine, instead of any of the preparations of opium, in consequence of the urgency and painful nature of the symptoms and the necessity of a speedy relief.

A certain amount of prejudice has always existed against the use of aconite in the Army, in consequence I imagine of its being thought to be an emanation from the homœopathic system of quackery, but as this is a mistake, and the professing disciples of Hahnemann now openly ignoring infinitesimal doses (by adopting pilules and tinctures, instead of globules), I trust it may come more extensively into use, as I feel convinced of its being a most valuable medicine, and should recommend it in all acute cases, and have little doubt but that it would prove useful in laryngitis, asthma, erysipelas, and in the early stages of all fevers.

Private S. S., aged 21 years, a recruit only a few weeks in the Service, a delicate-looking man, stated that on the night of the 8th of December, 1870, he had a rigor. On reporting sick, on morning of the 9th, he was found suffering severely from dyspnœa and orthopnœa, and at the same time in an extreme state of debility, could hardly stand, and had to be assisted into the hospital ward. He looked as if suddenly struck down with typhus fever more than suffering from an acute attack of lung inflammation. On examination, distinct small crepitation was heard over a large part of right lung, with dulness on percussion. Respirations, counted some hours after admission, were found to be 42 in the minute, with a pulse of 102. Blistering fluid was applied to side, 7 inches by 9 inches, and after vesication, a jacket poultice. At night chlorodyne m.xx was given.

*Dec.* 10.—Appears better this morning, in a profuse perspiration. Respirations 34, pulse 82, pain somewhat less. Expectoration frothy, with rust-coloured mucus and some streaks of bright red blood.

*Dec.* 11.—Left lung attacked, pain excessive. Respirations 59, laboured; pulse 100. Small crepitation heard on left side, but stethoscopic examination caused so much distress it was deemed advisable not to make a minute examination, there being no doubt as to the nature of the disease. Large blistered surface to be opened as on right side and jacket poultice to be continued, and tinct. aconite m.j. in camphor water to be given every quarter of an hour for two hours. At the expiration of that time he was very much relieved. Respirations less rapid (50), pulse 100; cough less distressing.

*Dec.* 12.—Felt better this morning, but about 11 A.M. severe pain came on in left side. Found him suffering intensely; respiration sighing, over 60 in the minute; pulse thready, but not compressible, 86; face much flushed, large red patches on cheeks. Tinct. aconite m.j. every 10 minutes for an hour.

2·30 P.M.—Got relief after the third dose of the aconite. Respirations 48, pulse 100.

At 10 P.M., another severe attack of orthopnœa occurred, and the tinct. aconite given for an hour, as before, with the same result.

*Dec.* 13.—Much better in every way this morning, free from pain. Respirations 38, pulse 60; skin cool; expectoration as before.

The case subsequently progressed most favourably without anything worthy of note occurring, and on the 4th of January, 1871, the man was discharged from hospital, and after three days' convalescence resumed his duty.

### 3. *Case of Syphilitic Herpes. By Staff Assistant-Surgeon Curran.*

Private J. H., of the 17th Lancers, who has only 1 year and 8 months' service, and who has never been abroad, says that he had a sore on the prepuce three years ago, which would appear from his own account of it to have been a soft one, and which, he adds, healed of itself, under his own management and with such aid only as it could derive from rest and the application of cold water. This does not seem to have affected him constitutionally either then or subsequently. He appears to possess the average vigour of a man of his age, and he says himself he always enjoyed good health. Had gonorrhœa some six or seven months since, which had the effect of influencing his abstaining from intercourse till within the last three or four weeks, but latterly he returned to habits of indulgence, and he is now quite unable to point to any one intercourse or woman as the source of his present ailment.

On admission here* on the 16th of March, 1871, he was found to be suffering from a hard sore of some five days' duration, on the under aspect of the prepuce, and that structure was itself enlarged, swollen, and pendulous. The glans looked red and irritable, and there was some œdema and infiltration of the neighbouring integument. He says his present sore occupies the very same position as that occupied by his former one, and it appeared eight days after connection. The glands in both groins were enlarged and indurated, the nuchal glands were also enlarged, but there was no tenderness in either, and he could bear pressure on them all without flinching. He was placed in one of the wards set apart for the accommodation of such cases. The sore was dressed in the ordinary way, and mercury was not exhibited. On the evening of the 21st, a papulo-roseoloid eruption appeared on the arms and trunk, and this soon passed through the usual stages of papule, vesicle, and pustule. It spread rapidly under the form of zones with a broad base and dusky discoloration over the abdomen and round the loins, and passed thence, upwards and downwards, to invade the face and the extremities. Within 36 hours or so it had made its way to most parts of the body, and meanwhile there was no thirst or heat of skin, no pains in the loins, or feeling of constriction about the temples. Nothing, in fact, to denote the approach or indicate the recession of fever. He ate and slept well, was evidently free from pain, and there was no appearance of excitement or anxiety about him.

The face was attacked on or about the 30th of March, and was quite covered over the alæ of the nose and under the eyes on the 4th of April, but the eruption did not here assume so markedly vesicular a form as elsewhere, and the scabbing and discolouration were also less. Meanwhile the eruption

* General Hospital, Dublin.

on the belly began to fade, but as it faded from the abdomen it appeared on the thighs and calves of the legs, and it bore everywhere, and from the very first, a striking resemblance to an attack of small-pox. There were, however, none of the other usual accessories of that disorder; the eruption in the case under review did not follow the same sequence, and its course and continuance evidently entitle it to a separate designation and character. Altogether the eruption lasted eight days or so on the chest and abdomen, and it has already taken upwards of three weeks to exhaust itself elsewhere. Indeed, it can scarcely be said to have run its course within that time, inasmuch as fresh vesicles appear every now and then on different parts of the body, and several were seen on the legs and thighs as late as the 17th instant.* This tendency to recur is one of the worst features of this class of cases, and this alone ought to distinguish it from other diseases of the same type. As might be expected under the circumstances, his health has suffered to some extent from the discharge and confinement, and support was accordingly allowed him from an early period.

As regards the character of the eruption, the vesicles are of about the usual size of varioloid, but there was no appearance of mammillation about them anywhere, and each contained a hair in its centre, which would seem to imply that the follicles were more engaged than the cutis itself. They also had a broader base and a more globular form than those of small-pox. The contents, at first limpid and transparent, soon became opaque and of a citrine hue, and there was no escape of fluid from them at any time. The process of scabbing was brought about not so much by maturation as by the development of a little dark spot at the apex of each, which increasing in area as it receded from the centre, gradually extended to the side, and finally involved the entire surface. The liquid contents underwent, meanwhile, a process of solidification or concretion that entered into the composition of, if it did not actually constitute, the overlying crust, and this falling off disclosed a discoloured and slightly indented surface underneath. The treatment has simply consisted in confinement to bed in a roomy, well ventilated, and separate ward; in attention to the bowels, and the use of a sufficiently supporting-non-stimulant diet.

*Remarks.*—Such interest as may be said to attach to the recital of this case centres in the fact that it was at first mistaken by myself and a junior colleague for small-pox, and that too in face of the doubts expressed by the Surgeon-Major in charge as to the nature of it, and in opposition to the more distinctly expressed opinion of Staff Surgeon Johnston, that it was syphilitic only. We are both now satisfied that we were wrong, and on looking into the literature of the subject, I find that the disease, though a rare one, is yet of more frequent occurrence than I had anticipated. There is scarcely any mention made of it in the older syphilographies, but it is well portrayed in the writings of Cazenave, Bumstead, and Lancereaux, for references to which I am indebted to the kindness of Staff-Surgeon Dr. Johnstone—and a few words from each of these will throw more light on its history and progress than any description I could indite. Cazenave, translated by Burgess, p. 371, describing the disease under the head of "Vesicular Syphilitic Eruption," says, "This variety was for a long time considered as one of the most rare forms "which syphilis could assume. Biett met with it only a few times, but we "have seen it repeatedly, and believe that, if not very common, it occurs more "frequently than is generally supposed." And after giving some particulars of a case of the kind that came under his notice, he adds, "the eruption was "at once seen to be vesicular, and pronounced chicken-pock. . . . . It covered "nearly the whole body, and the vesicles were in *different stages, some being* "*nascent and others dried up.* . . . . . The vesicles were small, resting on a "broad base, and surrounded by an areola of vivid copper colour; *their pro-* "*gress was slow, and they were unattended by any local symptoms.*" The *italics* are mine, but the point of the description can be easily realized without them, and Bumstead is even more precise and definite. Describing the disease, he says, under the head of "Syphilitic Vesicles," p. 547, "A vesicular eruption "is the rarest of all the syphilodermata, although it is now admitted to be "more frequent than was at one time supposed. . . . . The parts which are

* April 1871.

"most frequently affected are the back, face, and extremities. The vesicles "may either be large and globular, small and acuminated, scattered irregularly "over the surface, or arranged in groups. *Many of them are found to be "traversed by a hair*, showing that the chief seat of the eruption is the hair "follicles." And again he adds, "The herpetic variety may consist of large "globular vesicles, containing a citrine-coloured fluid, and arranged in irregular "groups seated upon a dark red base, resembling the patches of herpes phlycte- "nodes, or the vesicles may be smaller and collected into groups, which are "either circular or ovoid, as in herpes circinatus." This description clearly applies to the disease here referred to, and Lancereaux, describing a similar condition, says, Vol. I, p. 148, "Sydenham Society's Transactions for 1868," "The vesicular syphilide *resembling chicken-pox*, in which the disseminated "vesicles, which are sometimes pointed, sometimes globular, and sometimes "depressed at the centre, are filled with a serous fluid, which soon becomes "opaque, and often ends by being converted into a purulent fluid; hence "a greater resemblance to varioloid than to chicken-pox. Moreover, each "vesicle is surrounded by a copper-coloured ring." These few quotations from such accessible sources clearly prove the existence of a disease which may at its first appearance and during seasons like the present, be easily mistaken for small-pox, and especially so as the latter was recently treated in the same hospital. The absence of premonitory symptoms, the sudden accession of the rash, the comparative immunity of the face, and the character and progress of the disease ought, indeed, to have put me on my guard, but I had never seen a similar case before, and, as Carmichael well observes, "all eruptions, venereal or "not venereal, imperceptibly glide into those of the nearest character; and "it often happens that practitioners can only determine the nature of the erup- "tion for which he is called upon to prescribe, by an attentive consideration of "its progress." The true nature of this case only developed itself as it advanced, it is therefore calculated to inspire caution and counsel reserve, and its record may prove useful by showing others that such a condition occasionally obtains in military hospitals, and clearing the course for a more accurate appreciation and diagnosis of eruptive diseases. As such, it is offered for publication here, in the hope that the perusal of its history, however imperfectly executed, may induce others to suspend their judgments and wait for appearances which can only be determined by time, and which the most experienced may sometimes misinterpret or mistake. Too much caution cannot be exercised under such circumstances in any hospital, whether civil or military, and the resources of our art are weak enough already, without having their weakness more blazoned forth, and mayhap exaggerated by injudicious action or a too hasty straining after effect. This is the lesson the statement now submitted is calculated to teach, and if it only teach this well it will more than realize the object I had in view in writing it.

4. *Two Cases of Varicocele treated by Vidal's Operation. By Surgeon Porter, 97th Regiment.*

*Case* 1.—Driver J. N., R.A., aged 26 years, was invalided from India with varicocele of the left side, which he states first made its appearance in April 1869, after receiving a severe injury by a horse rearing and throwing him forward on the saddle. From this date he was unable to perform duty for any length of time in consequence of the acute pain it produced in the left side of scrotum, which became enlarged and soft, with dragging sensation in the loins. On admission into hospital in England, February 1870, the left side of scrotum was much elongated, having the usual feel of tortuous veins, and he was unable to use any exertion. On proposing an operation for the permanent cure, he at first objected, having undergone an unsuccessful operation with needles and an elastic band, which caused him great suffering, but after a few days he consented, and on the 23rd of April, 1870, the operation recommended by Vidal (*see* p. 690, Vol. II. of "Erichsen's Surgery") was performed by me. There was no difficulty in isolating the veins and passing the needles one behind and another in front of them. He experienced very little pain from the twisting of needle armed with wire. On the second day after the operation the needle was again twisted, and he felt some pain along the course of the inguinal canal. The

needle was twisted daily until the 2nd of May, when it was found free (the wire having cut through the veins) and removed. The slight inflammation caused was completely localized, and just enough to close the vessels. He was discharged to his depôt on the 1st of June quite cured. There were two symptoms which followed both operations. The first was complete retention of urine for the first three days, and the second was that on the third day after both operations he was seized with an attack of ague, a disease from which he had suffered in India.

*Case* 2.—Private E. E., 97th Regiment, aged 22 years. In 1867 he received a kick in the left testicle which was followed by severe orchitis, for which he was under treatment some time, and from his statement when he returned to his duty there were symptoms of varicocele. In April 1870 he was again under treatment with orchitis of the same testicle, having received another kick, and on returning to duty he found exertion produced great pain in the left testicle and dragging sensation in the loins, with fulness of left side of scrotum. He was again placed under treatment in the following June, when he was found to be suffering from an extensive varicocele; the scrotum was hanging down the inside of the thigh and distended with tortuous veins. After various modes of palliative treatment had been adopted without benefit. I resolved upon performing Vidal's operation, and on the 3rd of September passed the needles, as in Case No. 1, and without difficulty strangulated the veins. Each day after the operation the armed needle was twisted, and on the 11th removed, the wire having cut through the veins. There was some local inflammation and considerable pain along the cord, but no unfavourable symptom occurred, and he was discharged to duty on the 29th of September, completely cured. In the first case much inconvenience was felt during the process of the wire cutting through the veins by the weight of the testicles dragging the needle down between the thighs. To obviate this I constructed a support, on which the testicles were rested, composed of the cover of an old book sufficiently long to extend across the thighs, and from the centre of one side a semicircular piece was removed to correspond with the perineum. This contrivance was held in position by narrow tapes fastened at the upper corners and attached to a bandage round the waist. It gave great comfort in both cases.

### 5. *Two Cases of Hypospadiac Fissure treated by Urethroplasty. By Surgeon Porter, 97th Regiment.*

*Case* 1.—Private C. B., 1st Battalion Rifle Brigade, aged 35 years, suffered in India from extensive phagedænic ulceration, apparently non-syphilitic, which destroyed a portion of one ear, scalp, glans, penis and urethra, exposing a considerable extent of that canal. He was invalided to England, and on admission into hospital in February 1870, his condition was as follows:—Penis considerably reduced in size and somewhat distorted from contraction of an extensive cicatrix; the gland itself was much eaten away, and an opening into the uretha about three-quarters of an inch long and a quarter wide, immediately in front of the scrotum. He was much inconvenienced by not being able to command the stream of urine during the process of micturation. Operation April 8th, 1870. After the bladder had been evacuated and patient placed under the influence of chloroform, a flap of integument was carefully dissected from the healthy structures on the anterior part of scrotum, the lips of the fissure were evenly pared, and the edges of the flaps secured in apposition by sutures of silk thread. The wound was dressed with moist lint, and all danger of taction on the flap obviated by supporting the scrotum with a suitable pad and bandage. The urine was drawn off in the evening by an elastic catheter.

The case progressed favourably, and on the 10th slight suppuration began. One point of the flap looked sloughy, and the suture in this part was removed; the other sutures were not disturbed. At 10 P.M. this day patient stated he would not require the catheter to be introduced until next morning; but at 4 A.M. on the following morning he was seized with a sudden desire to micture, and, contrary to directions, passed the urine without an instrument. Some urine escaped through the anterior part of wound.

On the 13th, the remaining sutures were removed. Union was firm at the sides, but anteriorly there was a very small opening into the urethra.

On the 18th, further closure had taken place by granulation, which was proceeding in the enclosed edge.

22nd.—The catheter, which had been used daily, was now discontinued, patient being able to prevent all escape of urine.

2nd May.—Small opening touched with hot iron, which had the effect of causing closing by contraction. He made a satisfactory recovery, and was discharged to duty.

*Case* 2.—Private E. D., 1st Battalion 6th Regiment, aged 25 years. In 1867 he suffered from a phagedænic ulcer on the posterior part of the penis, which destroyed a portion of the prepuce integuments and opened into the urethra for a considerable extent. After being under treatment for some time, he returned to his duty apparently but little inconvenienced by the open urethra, and proceeded to India, where his health became much impaired from ophthalmia and fistula, very irritable. He was invalided home, and on the 12th of February 1870 was admitted into hospital, when the urethral canal was found to be exposed for about 1¼ inch, extending from base of glands penis towards the scrotum. The integuments at either side of the penis had sloughed, there was therefore no means of forming lateral flaps. I accordingly decided upon forming one flap from that portion of integument nearest the scrotum, and on 9th of April, 1870, after the bladder had been evacuated by means of an elastic catheter and patient chloroformed, dissected a flap about 2 inches in length and 1½ inch wide from the loose integuments at base of penis in front of scrotum. The edges of the fistulæ were then pared and flaps brought into apposition by means of silk sutures. The penis was bandaged to the scrotum, and whole well supported. He was not allowed to pass urine without the aid of a catheter, and being very attentive to instructions, the wound healed by first intention, and the operation proved most satisfactory.

He was kept on mild nutritious diet; very little fluid. Camphor and hyoscidem were administered to prevent erections. He was discharged the service on the 1st of June, 1870, for ophthalmia, but the fistula was quite cured.

### 6. *Case of Penetration of Thoracic Cavity, with Wound of the Lung. By Assistant-Surgeon J. R. Murray, M.D., Royal Horse Artillery.*

Private T. M., 2nd Battalion 17th Regiment, æt. 30, stationed at the Citadel, Fort George, Guernsey; a strongly built, muscular, healthy-looking man, of irregular habits; formerly a mess-servant, admitted to hospital at 10 p.m. on the evening of the 2nd of March, 1870.

The history of the case is as follows:—

He had been drinking freely all the evening, in the town of St. Sampson's, about half a mile from barracks, and being under the influence of liquor, and somewhat late for evening roll call, in order to save time he endeavoured to return to barracks by a short cut through some grass fields on the glacis of the Citadel, he mistook the path and stumbled upon a sunken fence, the top of which is on a level with the ground on which he was walking, and armed with very sharp spikes about a foot in length; he was impaled on the spikes, but managed, he knows not how, to wriggle off them, and his groans, as he lay on the ground, attracting the attention of the sentry at the Barrier Gate guard, close at hand, he was discovered and brought to hospital.

When seen by me, a quarter of an hour or twenty minutes after the accident, he was suffering severely from shock, almost amounting to collapse, the pulse was small and scarcely perceptible, the face pale, anxious and bathed in a profuse perspiration. There were two penetrating wounds of the right side of the chest, the more anterior of the two, about two inches in length, at a point two inches below the right nipple in the fourth intercostal space; a second, more posterior and at rather a lower level, had a stellate appearance; from both of these wounds, *air issued at each expiration, with a hissing sound*, audible to one entering the door of the ward; a very small quantity of blood welled out from both wounds. The skin on the right side of the neck and chest was slightly emphysematous, and crackled perceptibly under pressure of the finger. The right side of the thorax anteriorly, was everywhere preter-

naturally resonant on percussion. During the hasty examination made, he had two severe attacks of coughing. In the sputa there were a very few minute streaks of florid blood, such as are often seen in bronchitic sputa, but so small in quantity as to cause no uneasiness in my mind as to the prospect of hæmorrhage. Shortly after admission he vomited, the ejected matters having a very strong alcoholic odour; indeed he freely admitted he was intoxicated when the accident occurred, and now earnestly requested the attendance of a clergyman, stating that he felt he was dying.

As there was no hæmorrhage to speak of from the wounds, (and none apparently into the pleural cavity), they were at once closed by graduated pledgets of lint, retained by strapping; patient was placed on the affected side, enjoined not to move from that position, and put into a ward alone with an attendant, the strictest quiet to be maintained. Ordered an opiate, hot-water bottles to be applied to the feet which were very cold.

Seen again at 1 A.M. Very restless, and tries to remove the dressings.

*March 3rd.* Passed a quiet night, after repetition of the opiate; complains of some pain in region of wounds, and of short, dry cough with little expectoration. Not a trace of blood in the sputa, skin moist and warm, reaction perfectly established. No oozing from beneath the dressings. Perfect rest and quiet to be maintained.

11 P.M.—Considerable abdominal pain (but no tenderness) due to presence of flatus, and speedily relieved by a large tepid water enema, and an antispasmodic draught.

*March 4th.*—Slept soundly, breathes comparatively easily, and, much to my surprise, the temperature in the axilla, the pulse, and the respirations are normal.

Patient is cheerful and hopeful. The respiratory sounds on right side of chest are more distinct to-day, showing that the lung is endeavouring to recover itself and rise to the walls of the chest. Dressings undisturbed.

*Vespere.*—Doing well. Ordered castor oil and laudanum, the bowels not having acted since his admission.

*March 5th.*—Slept well last night. Complains a little of abdominal pain, due to tympanites, an enema was administered, and gave speedy relief.

*March 6th.*—Going on as well as could be desired. Respiratory sounds are now distinct as low as the level of the nipple; as the dressings have not yet been disturbed, no examination can be made below this point. Cough, very slight, expectoration scanty, and free from blood.

*March 7th.*—Feels quite comfortable and free from pain. There is decided dulness on percussion at right base posteriorly, and absence of respiratory murmur over a corresponding area. Respiratory sounds normal to the level of the nipple.

*March 8th.*—Removed the dressings, a few drops only of pus came from the anterior wound, they have both closed at their deeper parts, leaving small superficial ulcers, to be dressed with simple water dressings. Some bronchial expectoration, more to-day than there has been. Ordered an expectorant mixture.

*March 9th.*—Going on most satisfactorily; rests well at night, and his appetite is returning. He complains that he does not get enough to eat on spoon diet; allowed chicken diet. Wounds very healthy, dressed with carbolic acid lotion (1 in 40).

*March 14th.*—Had a severe fit of coughing this morning, when, as he expressed it, "he felt as if the wounds were being torn open." Dulness on percussion at right base diminishing, and friction sound audible at base, posteriorly. Respiratory murmurs are everywhere distinct. Sores nearly healed.

*March 17th.*—Still a little dulness at right base, friction sounds have ceased. Vesicular respiration quite re-established. Allowed to sit up in bed for an hour, propped up with pillows.

*March 20th.*—Little or no dulness at right base, friction sounds again audible, no pain or dyspnœa. Anterior wound has quite cicatrized, posterior one nearly so.

*March 21st.*—Sits up all the afternoon. Has an excellent appetite, and

regains strength rapidly, he says he feels quite well. Allowed a pint of beer daily.

*April 5th.*—Has steadily improved since last report. Is now quite well and strong. No pain on the fullest inspiration. The wounds have perfectly cicatrized. Lung sounds normal, with the exception of the faintest friction sound at higher base anteriorly. Discharged convalescent.

A month after his discharge from hospital I examined the man carefully, and found there was no appreciable contraction of the right side of the chest, and excepting a slight occasional pain in the cicatrices, during wet weather; he finds himself as strong and as well as he was before the injury, up to the time his regiment left the Channel Islands (July, 1870), he performed his regular duties without any inconvenience.

This case is one of great interest, and shows with how little constitutional disturbance, recovery may take place in a healthy subject from an injury of such extreme danger as that of penetration of the thoraic cavity with injury of the lung. At no time during the progress of the case did the temperature ever reach above 100° (on the second day) and then only for a few hours, the pulse and respirations all through the progress of the case remaining normal.

As the case advanced, the question presented itself, *Was the Lung itself wounded?* On the morning succeeding the accident, guided by the presence of blood in the sputum, the degree of shock, almost amounting to collapse, the depth to which the spikes had penetrated, and their sharpness at the points, I felt satisfied that the lung had been penetrated. But as the case advanced to recovery, the absence of grave inflammatory symptoms in the lung, and its uninterrupted favourable progress caused me to doubt whether the injury had been of such gravity. It was not until I learned that the experience of Continental surgeons in recent wars had placed, beyond a doubt, the fact that bayonet wounds implicating the lung when such are treated by complete occlusion (as this one had been) made perfect and speedy recoveries, that my original diagnosis was confirmed and strengthened by the opinion of others, and no hesitation now exists, in pronouncing it a case of penetration of the thoracic cavity with wound of the lung.

In company with an officer of his regiment, I visited the scene of the accident on the following morning; we found one of the spikes on which he had been impaled coated with blood for about four inches from its point, the other for about two inches and a half. From the calibre of the spikes, and their sharp edges, which must have rubbed roughly against the ribs, and denuded them slightly of periostium, the possibility of exfoliation occurring, presented itself to my mind, but as I have said elsewhere the wounds closed most kindly, and the ribs escaped serious injury.

TABLE of Pulse and Respirations.

| | Mar. 3. | | Mar. 4. | | Mar. 5. | | Mar. 6. | | Mar. 7. | | Mar. 8. | | Mar. 9. | | Mar. 10. | | Mar. 11. | | Mar. 12. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M. | E. | M | E. | M. | E. | M. | E. | M. | E. | M. | E. | M. | E. | M. | E. | M. | E. | M. | E. |
| Pulse ... ... | 78 | 80 | 78 | 74 | 76 | 74 | 68 | 72 | 68 | 70 | 69 | 76 | 74 | 66 | 66 | 63 | 64 | 63 | 62 | 60 |
| Respiration ... | 25 | 25 | 25 | 20 | 22 | 22 | 23 | 22 | 21 | 23 | 22 | 21 | 22 | 21 | 21 | 23 | 22 | 20 | 19 | 20 |

TABLE of Pulse and Respirations—*continued.*

| | Mar. 13. | | Mar. 14. | | Mar. 15. | | Mar. 16. | | Mar. 17. | | Mar. 18. | | Mar. 19. | | Mar. 20. | | Mar. 21. | | Mar. 22. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M. | E. | M. | E. | M. | E. | M. | E. | M. | E. | M. | E. | M. | E. | M. | E. | M. | E. | M. | E. |
| Pulse ... ... | 76 | 76 | 76 | 79 | 92 | 82 | 80 | 80 | 70 | 68 | 76 | 64 | 68 | 60 | 64 | 68 | 64 | 64 | 70 | 68 |
| Respiration ... | 20 | 23 | 22 | 24 | 23 | 22 | 20 | 20 | 20 | 18 | 18 | 20 | 18 | 20 | 20 | 20 | 18 | 20 | 18 | 18 |

7. *Case of Scrofulous Abscess in the Walls of the Left Ventricle of Heart. By Surgeon A. E. T. Longhurst, M.D., 4th Battalion 60th Rifles.*

Private F. K., 3rd Battalion 60th Rifle Depôt, died suddenly at Colchester on 8th July, 1871. The history of the case is taken from the Medical History Sheet and such other information as could be collected.

Was occupied as a porter before enlisting, and since then, his habits are recorded as temperate, and his conduct very good. He suffered from Remittent Fever at Wellington, Madras, in 1861, and Syphilis Sec. and Scrofula, in Burmah in 1862, for both of which affections he was frequently in hospital until return to England, "time expired," in June, 1866, re-engaged in October of the same year, married, and soon afterwards returned to India, being invalided from Bangalore in July 1869, for "Fungus Testis," and embarked on board the ship, "Renown," on the 2nd of March, 1870, *vid* the Cape; had little or no sickness on board, and arrived at Netley on the 2nd of June, being 8 days in hospital, under the head of "No Apparent Disease," and was discharged to join the depôt at Aldershot on the 10th of that month, where he arrived in apparent good health; and since that date, though generally employed as a servant, he performed all the usual duties of a soldier, including route marches, drill, field days, &c.

On the morning of the 6th July, 1871, reported himself sick, being weak, with uneasiness in the cardiac region, his countenance singularly pale and anæmic, and his pulse feeble. The symptoms, however, of ordinary health were good, the heart sounds regular but rather faint, and the breathing distant. Being an officer's servant, he did not wish to be taken into hospital, and was accordingly ordered steel mixture twice daily. On returning from his dinner to his master's quarters two days afterwards, about 2 P.M., on the 8th July, he felt a sudden pain in the region of the heart, placed his hand to his side and fell dead.

His wife said that he had been in bad health for the last 6 or 7 months, complaining of weakness, langour, and of feeling at times very tired with occasional pain in the cardiac space, but that his appetite was good, and he had performed all his usual parades and duties without any active symptom of disease. His father died of consumption at the age of 38 years.

Autopsy, 46 hours after death, which was delayed for the inquest. Body well nourished, frame large, discoloured from advanced decomposition about the neck and shoulders, with considerable oozing of the usual dark fluid from the nose, &c. Rigor mortis, subsiding, and scars as of scrofulous abscess beneath the chin. Fatty tissue everywhere abundant. On opening the thorax the pericardium was seen of unusual size, covered below, with masses of fat in fringes, but above, having much its usual appearance. On slitting it up, the right ventricle was seen extremely distended and covered with soft reddish lymph, slightly adherent on under side, giving it the appearance of a large bullæ; the pericardium was intimately adherent to the whole of the enlarged left ventricle. The right chamber of the heart was much enlarged, its walls excessively thin and flabby, containing no clots. Valves seemed capable of acting. The walls of the enlarged left ventricle were much thickened, the cavity not much altered. The muscular structure, to all appearances, entirely changed by fatty degeneration, which did not extend to the carnæ columnæ, and a section of the walls in two places, displayed a mass of scrophulous-looking matter, only separated by the endocardium from the chamber-valves, competent, the whole much stained, including the aorta. Lungs densely congested and collapsed, but free from all trace of tubercular deposition. Liver enlarged, darkly congested and softened, tissue tearing; capsule easily separable. Two gall stones of large size, in the gall bladder, kidneys much congested, capsule not unusually fatty.

The following points appear to me to be of interest, and worthy of consideration in connection with this case:—

1. The probable date of primary deposit, or change in muscular structure of left ventricle.
2. The determining cause of deposit in that special locality.
3. The probable duration of the change.

4. The absence of tubercular disease in the lungs or other viscera.

5. The existence, during life, of so few symptoms of ill health, with such serious and extensive disease in so vital an organ.

6. The efficient action of the heart, with such destructive change going on in the wall of the ventricle.

7. The resisting power of the lining membrane of the ventricle, which remained intact, notwithstanding the complete destruction of the muscular wall.

8. The immediate cause of death appeared, by post-mortem examination, to have been the sudden cessation of the heart's action from positive want of muscular structure, the place of which was occupied by one large abscess.

8. *Aneurism of left Femoral Artery, Ligature of External Iliac. By Assistant-Surgeon Clapp, 54th Regiment.*

No. 1145, Private S. P., 54th Regiment, 29 years of age, 11 years service, unmarried, a shoe-maker by trade, reported himself sick at Curragh Camp on the 12th January, 1871, complaining that he was unable to do the "Route "Marching," owing to cramps and a feeling of numbness and weakness in the left leg and foot after walking a mile or two.

He stated that he first remarked the numbness of the foot in June last whilst on detachment, but as he had no marching to do (being employed at his trade) he never took any notice of it, and that he would not then (12th January) have reported himself sick but for the marching; he also stated that he never strained or injured himself in any way to account for it.

He was a sallow complexioned, tolerably healthy-looking man, but of dissolute and rather intemperate habits, and had served two years in India.

His Medical History Sheet showed 2 admissions for Gonorrhœa, 2 for Primary Syphilis, and 1 for Secondary Syphilis as far back as the beginning of 1863. He had not had any mercury.

On his walking up and down the room there was nothing unusual in his gait, and on examining him in bed there was no apparent difference in size between the two legs or feet, but the left foot appeared paler in colour and was sensibly colder than the right. On further examination a slight fulness in the left groin was apparent, which had quite escaped the patient's notice, and on manipulation this swelling was found to be pulsatile, slightly compressible, expanding in all directions under the hand with each pulsation, and on stethoscopic examination a loud purring bruit was distinctly audible all over it; deep pressure on the external iliac quite arrested all pulsation and bruit. This tumour, which was round, smooth, about the size of a hen's egg, and distinctly circumscribed, was situated close under "Poupart's ligament."

The man's health was otherwise good; his heart and the other blood vessels apparently free from disease, and he stated that as long as he kept quiet and did not walk too much he did not feel anything the matter with his leg.

He was admitted into hospital, and as the aneurism was too high up to admit of pressure being employed, I determined, prior to operation, to try medical treatment, accordingly he was ordered to remain in bed, was put on half diet, and had Tinct. Digitatis m.xx. gradually increased to m.xxx. 3 times a day, which treatment was kept up from 13th January (the date of admission) to the 19th January. The tumour in the meanwhile became palpably larger, but at the same time harder and less compressible, and the sense of numbness in the leg was now complained of whilst lying down, also a feeling of uneasiness in the groin. On the 19th January the medicine was changed to tinct. ferri perchlorid, m.xxx. 3 times a day, which was continued up to the 9th March.

Under this treatment the aneurism at first ceased to enlarge, became much harder and less pulsatile, the bruit also became sharper and more thrilling in its nature; but about the beginning of March enlargement began to take place rapidly, and pain was complained of in the leg and outside of knee.

His appetite now began to fail and his nights to be restless; the pain gradually became worse and extended up to the thigh and into the groin; œdema of the limb set in. The aneurism was now the size of an orange.

On the 7th March the swelling of the limb became suddenly worse with aggravation of the pain, the tumour became less defined, but the bruit and thrill persisted.

By the 9th March the œdema had extended slightly over the lower portion of the abdomen; constant and agonizing pain was complained of in the leg and groin; his appetite had completely failed; morphia failed to procure sleep, and the man's countenance was anxious and haggard. After consultation with Deputy Inspector-General S. Mc. V. Lloyd, I determined to tie the external iliac artery.

Accordingly on the 10th March, the bowels having been previously cleared out by an enema, I proceeded to operate, assisted by Assistant-Surgeon Curtis, 18th Regiment. Chloroform having been administered, an incision about 4 inches in length was made, about ¾ of an inch above, and parallel to Poupart's ligament, beginning a little above the outer angle of the external abdominal ring; in this incision a small branch of Circumflex Ilii artery was wounded, but gave no trouble; the muscles and fascia were now successively divided on a director, and the peritoneum separated from the iliac fossa by the finger nail, the upper edge of the wound being retracted by a bent spatula; the artery was now felt pulsating and apparently healthy; the sheath, about 2 inches above Poupart's ligament, was carefully opened to a very limited extent, just sufficient for the eye to distinguish the healthy artery. The aneurism needle, armed with a stout silk ligature, was now passed under the artery from within outwards and the artery tied, when all pulsation was found to have ceased in the tumour. The wound was carefully washed out with carbolic lotion, 1—40, and all bleeding having ceased the parts were brought together with silk sutures, a couple of straps of plaster applied, and a double fold of lint saturated with carbolic oil, 1—5, placed over the wound, a pad of lint and a light bandage over all, the bandage employed being a kind of many-tailed spica.

The limb itself was enveloped in cotton wool and a flannel bandage lightly applied.

The patient was removed to bed and the limb supported by means of pillows in a partially flexed condition on its outer side.

Vomiting was rather troublesome after recovery from the chloroform, but this passed off in half an hour. Want of light was a great drawback during the operation, as the only place in which to perform it was a wooden "hospital "hut," lighted solely by side windows, which only measure 2 feet 9 inches long by 1 foot 7 inches high.

After removal to bed the patient expressed himself as feeling quite comfortable and free from pain, his pulse was full and firm, about 96.

In the evening he was quite comfortable, free from pain or uneasiness, there was no perceptible fall in the temperature of the limb, little or no oozing from the wound, and he had taken some milk since the operation but had not slept. He was ordered liquor morphiæ m. 40 at bed time.

*March* 11.—Passed a good night; is free from pain or feverishness; tongue clean; œdema of limb slightly less; temperature of limb good; all pulsation and bruit have ceased, no discharge from the wound; bowels not moved; took bread and milk for breakfast. Dressing not touched.

*March* 12*th*.—Is looking quite cheerful; pulse 94 soft; skin cool and moist; tongue clean; made a good breakfast; bowels not moved; limb less swollen and its temperature natural; no return of pulsation: removed the dressings, hardly a single drop of discharge; wound seems to have united by first intention; similar dressings rapidly replaced.

*March* 13*th*.—Could not be better; no discharge; slept well without a draught; no fall in temperature of limb.

*March* 13*th*, *vesp*.—Stomach rather irritable.

*March* 14*th*.—Dressing again changed and replaced as before, no discharge; stomach all right again; bowels not moved since the operation.

*March* 15*th*.—Rather feverish this morning; no discharge from under the dressings, which were not touched; tumour hard and solid; bowels not moved.

*March* 16*th*.—This morning there is some œdema of lower portion of abdomen; also some slight sanious discharge from the outer part of wound which has superficially re-opened from the ligature outwards; the edges of the wound are tumified and inverted; removed sutures; wound washed with carbolic lotion and dressed as before. General state good.

*March* 17*th*.—Rather more discharge, sanious and rather bad swelling; same dressing.

*March* 18*th*.—Wound not uniting as rapidly as desirable; discharge sanious and offensive; senna draught as the bowels have not been moved since the operation; general state continues to improve; same dressing.

*March* 18*th*, *vesp*.—Bowels moved twice.

*March* 19*th*.—Rather feverish last night and sweated a little; appetite good; pulse 104; about ½ an oz. of discharge in the 24 hours, this is dark looking; edges of wound healthy; tumour solid; slight œdema of foot still remains, but the thigh feels quite natural, except being still enlarged; its temperature is normal; wound washed with carbolic lotion &c., as before.

*March* 20*th*.—Febrile exacerbation last night, otherwise the same; decoction of cinchona and dilute sulphuric acid.

*March* 21*st*.—Rather more discharge of the same dark nature, not less offensive; edges of wound healthy and granulating; about an ounce of dark matter suddenly gushed up after the wound had been washed; limb free from pain or uneasiness; tumour continues solid; thigh free from œdema but foot still pits under pressure; pulse 102; tongue clean; appetite good.

*March* 22*nd to* 24*th*.—Discharge continued similar in quality; has nocturnal febrile exacerbations; wound healing up, inner ⅔ and outer ½, united up to surface.

*March* 26*th*.—Wound going on most satisfactorily; general health good.

*March* 28*th*.—Wound doing well; ligature came away this morning; œdema of foot disappearing; tumour solid and diminishing in size.

*March* 29*th*.—Wound looking very well; discharge healthy and moderate in quantity; tongue clean; pulse 92; limb has now almost recovered its natural size, but a small bed-sore has formed on left buttock; carbolic lotion and oil as before.

*March* 31*st*.—Skin surrounding the wound rather excoriated from the carbolic oil; granulations rather inclined to bleed; discharge moderate and healthy; general health good. Oxide of zinc ointment to the wound.

*April* 1*st to* 3*rd*.—Suffered from slight diarrhœa; wound going on well; discharge thick and purulent, and not much of it.

*April* 4*th*.—Rather more discharge this morning on the dressing, and pus was observed to be oozing from the aperture of the ligature; about 2 ozs. of pus intimately mixed with black specks of dried blood escaped from this aperture on pressure along the course of the femoral artery.

The wound has healed up with the exception of the aperture left by the ligature, and another small one near the outer edge of the incision; general health good; picking up flesh though still much emaciated; bowels regular; sleeps pretty well; the carbolic oil resumed.

*April* 6*th*.—Considerable discharge on dressings, but none on making pressure; aneurismal tumour disappearing; general health good; sleeps well.

*April* 7*th*.—On making steady pressure along the upper and inner third of thigh last evening, about 3 ozs. of fetid pus intimately mixed up with coffee ground like matter escaped by the inner aperture, and about an ounce this morning on making pressure over same situation. Thigh rather larger, but free from any tenderness, redness, or fluctuation. Appetite good; sleeps well, but feels rather feverish of an evening.

*April* 8*th and* 9*th*.—More discharge, both on dressing and on making pressure, the discharge which comes solely from the upper third of thigh contains a larger proportion of coffee grounds matter and is fetid; patient is feverish and sweats at night. Thigh free from uneasiness or fluctuation, but inclined to be œdematous. Carbolic dressing continued.

*April* 10*th to* 12*th*.—Pulse daily increasing in rapidity (100-106), night sweats, discharge more profuse, 4 to 6 oz. daily, fetid and containing much "coffee grounds" matter, upper half of thigh more swollen and doughy, but free from redness, tension, pain, or fluctuation, the pus appears to be generally diffused in upper ⅓ of thigh, none comes from the abdomen; appetite, however, continues good; carbolic oil continued, also bark mixture.

*April* 13*th*.—Rather more discharge; carbolic lotion 1-40 injected through opening in groin, and allowed to remain in.

*April* 14*th*.—No discharge on dressings, but about 4 ozs. on pressing the limb; still fetid, same treatment.

*April* 15*th*.—Had a severe rigor yesterday after the dressing; discharge, &c. as yesterday; same treatment.

*April 15th, vesp.*—Rigor repeated after the dressing; pulse 116, skin hot and dry; did not eat his dinner.

*April 16th.*—Better this morning; pulse 104; tongue clean; slept well; made a good breakfast; not quite so much discharge; thigh less doughy; same treatment, also 2 grs. of quinine morning and evening.

*April 17th.*—Pulse 96; passed a better night than he has done for some time; did not sweat near so much; rigor *not* repeated; is better in *every* respect; a large slough came away in the discharge this morning. Continue the medicine, injection and carbolic oil.

*April 19.*—Another large slough came away through the inner opening, about ½ an oz. of pus on the dressing and about ʒi on pressure; matter thick and healthy; general health improving. Continue quinine and carbolic oil.

*April 20th.*—A third large slough came away this morning, and about the same quantity of pus; limb less swollen and quite natural to the touch; pulse 82.

*April 23rd.*—Sat up for 2 hours yesterday and feels all the better for it.

*April 24th to May 4th.*—Discharge becoming daily less; outer opening has now healed up; the inner one, through which the ligature passed, is surrounded with prominent granulations, which are being touched with nitrate of silver; patient is daily gaining strength and flesh. Lint wet with carbolic lotion to opening.

*May 11th.*—Opening not quite healed yet, the limb is merely stained with matter; thigh and leg nearly of the natural size; patient gets about by the aid of another man; general health and spirits good.

*May 16th.*—Wound perfectly healed; limb still weak, but daily getting stronger; patient is still taking the quinine.

*May 23rd, 74th day.*—The thigh is now of its natural size, but the foot is still a little puffy. The site of the aneurism is now occupied by a small deep-seated induration, not larger than a walnut, and quite free from pulsation. Patient is fast regaining strength in the limb, and his general health is good.

### 9. *Case of Thrombosis, Occlusion of right popliteal Artery, and Amputation.* *By Staff-Assistant Surgeon Batho.*

Private J. S., 1st Battalion Coldstream Guards, aged 23, a recruit, was admitted into hospital, at Warley, on 15th February, 1871, suffering from acute rheumatism. Is tall, of slight frame and anœmic appearance, lately a farm labourer; states that he has experienced much difficulty in getting work, and consequently has suffered considerable privations. Has usually enjoyed good health, and has not previously laboured under serious disease, save one attack of rheumatism; has never been affected with enthetic disease. At time of admission, his wrists, ankles, and knees were swollen and painful, pulse was quick, tongue furred, urine high coloured and acid, sweat profuse and acid, and attended with the characteristic odour. Mucous râles were heard over chest and expectoration was bronchitic. Was treated with alkalies internally, mustard plasters, followed by flannel bandages to the affected joints, turpentine stupes to the chest, and opiates at bed-time. Under the use of these remedies the rheumatic symptoms subsided, without any cardiac complication supervening, and he apparently became convalescent. March 1st he showed slight symptoms of exhaustion, and his sputa were somewhat tinged with a rusty colour, though none of the physical signs of pneumonia were present. Stupes ordered to be applied to the chest at frequent intervals.

*March 2nd.*—At the morning visit to-day he complained of a feeling of cold in the right leg, though lying near the fire and well wrapped up; no perceptible difference of temperature can be detected in the two lower extremities. Ordered to have the foot and leg enveloped in a flannel bandage, and a foot warmer to be constantly applied; tongue is clean; pulse 84, occasionally, but very seldom, intermittent; his heart's sounds are normal; urine is still high coloured, and sweat is profuse and acid, but other symptoms of rheumatism have left him.

*March 2nd, evening.*—There is now a marked lessening of temperature of right foot and leg, as high as the knee, appreciable by the touch. I cannot detect the arteries of the foot or leg. The femoral pulsation is normal, but

that of the popliteal artery is absent. There is no doubt a plugging of the vessel, in or near the popliteal space. Foot and leg enveloped in cotton wool and flannel bandages, and a foot warmer constantly applied. Ordered ammonia mixture and morphia draught at bed time.

*March 3rd.*—Diagnosis of thrombosis undoubtedly confirmed to-day. Leg is stony cold to the knee, and a dusky discolouration has appeared over the dorsum of the foot. Can move his ankle, but has no power whatever over his toes. General symptoms are good; he takes his nourishment well and performs his alvine and urinary functions naturally. Tongue is clean; pulse 84, moderately full. Seen in consultation with Surgeon Morphew and Assistant-Surgeon M. L. White, the Royal regiment, who concur in diagnosis.

*March 3rd, vespere.*—In much the same state. Toes are in a state of dry gangrene. Morphia draught at bed time.

*March 4th.*—Slept pretty well during the night, having a man with him to keep the foot warmer constantly filled with warm water. Gangrene is advancing, toes have become dry and horny.

*March 4th, evening.*—Morphine draught at bed time.

*March 5th.*—Slept fairly last night, and is cheerful this morning. Still perspires a great deal; tongue clean, bowels open. Pulsation of right common femoral can be felt; temperature of right thigh normal.

*March 5th, evening.*—In same state; morphine draught.

*March 6th.*—Passed a fair night and his condition to-day is unchanged.

*March 7th.*—Condition unchanged; pulsation in right common femoral artery is feeble.

*March 8th.*—Same report, gangrene slowly extending; toes are quite dry.

*March 9th.*—Slept fairly last night; pulse 85, moderately full; tongue clean; alvine and urinary excretions natural, pulsation can still be felt in right femoral artery.

*March 10th.*—In same state.

*March 11th.*—Sleeps well and eats well; bowels open; bullæ have formed on anterior aspect of leg and on calf. Pan of charcoal to be placed by the side of the leg under a cradle.

*March 12th.*—Same report.

*March 13th.*—Gangrene extending very slowly; general condition favourable.

*March 14th.*—Sleeps well and eats well; appears to be putting on flesh; gangrene as previously described.

*March 16th.*—Leg is slightly offensive; iodine in chip boxes placed round it.

*March 17th.*—Same report.

*March 19th.*—No change.

*March 22nd.*—Gangrene has not extended further, though the discolouration is much intensified, amounting now to blackness. There is an unpleasant odour from the leg, in spite of the free use of disinfectants.

*March 22nd, evening.*—Has been feverish during the day, and this evening his skin is hot and pulse 110, though regular and firm; bowels are open.

*March 23rd.*—Slept fairly last night, but is very feverish this morning: tongue red and glazed: pulse 110; complains of much pain in the leg; upper limit of gangrene is now 4 inches below the head of the tibia.

*March 23rd, evening.*—Pulse this evening 120; complains much of thirst.

*March 24th.*—Slept fairly last night, and is not quite so feverish this morning; tongue red and glazed; pulse 104; bowels are confined; temperature in axilla 99·1°: temperature of left thigh just above the knee 92·6°; temperature of right thigh just above the knee 89·6°; to take a seidlitz powder directly.

*March 24th, evening.*—In much same state; sweats a good deal and appears very weak. Takes his nourishment very badly and seems to be losing ground; pulse 110, regular but somewhat weak; bowels not yet opened; ordered 2 aperient pills.

*March 25th.*—Slept but little last night, and is not so well this morning; face appears worn and haggard, skin is bathed in sweat: pulse 110; bowels not yet open; tongue furred and brown in patches; has a slight systolic, mitral bruit audible at the apex of the heart; sounds heard over whole chest;

percussion normal; ordered enema at once; has a small bedsore forming over sacrum, to be dressed with collodion.

*March 25th, evening.*—Bowels have acted freely once or twice since the enema, and he has taken a little food.

*March 26th.*—Slept well last night, and appears brighter and more cheerful to-day; pulse 108, feeble; tongue cleaner; temperature of right thigh just above knee 93·2°; left thigh, 93·2°; temperature in axilla, 98°; gangrene has not extended.

*March 26th, evening.*—Has not taken his nourishment at all well; his appetite is very capricious and he requires to have his food or the mode of cooking constantly varied.

*March 27th.*—Slept fairly last night and is cheerful this morning; tongue slightly furred in patches; pulse 110, feeble; temperature of axilla 98°; right thigh 90·4; left 93·6; bowels have acted both yesterday and to-day.

*March 28th.*—Slept well during the night, and took his breakfast fairly this morning, eating an egg and a little bread and butter; tongue clean; pulse 100, feeble. As the limit of the gangrene appeared now to be defined, and as there seemed to be no hope of his condition improving without the limb being removed, but rather a great probability, almost amounting to certainty, that he would die from septicæmia, it was decided in consultation to perform amputation of the thigh about the junction of the lower and middle third; chloroform was administered and Professor Syme's modified circular operation having been selected, I made anterior and posterior flaps of integument, dissecting from without inwards. The flaps were detached from the muscles for about two inches above their angle of union; the anterior muscles were divided short, and the posterior as long as possible. Only two vessels required ligature; these were the femoral, reduced to about the calibre of the healthy radial, and one of the perforating arteries. Scarcely any loss of blood occurred, and the flaps were brought together by numerous silver wire sutures. The stump was lightly dressed with strips of lint steeped in carbolic solution (1-40); these being secured by a few turns of a bandage; stump was placed on the ordinary stump pillow. The patient bore the chloroform well, his pulse becoming fuller whilst he was under its influence.

*March 28th, vespere.*—Pulse has gained much in fulness and is still 100. Has taken his nourishment better than for several days previously, and is hopeful and cheerful; no hæmorrhage or pain; stump comfortable.

*March 29th.*—Slept the greater part of the night, and is free from pain or uneasiness this morning. There has been a slight discharge of sanguineous fluid from the stump. Patient has passed urine freely, and has taken his breakfast fairly; pulse 100, moderately full. He appears somewhat drowsy and exhausted. Examination of amputated limb. The femoral artery was patulous at the point of section, and its coats appeared healthy, although a great lessening of calibre had taken place. It was free from clot as far as the bifurcation where the plugging appeared to have occurred. On cutting through the heads of the gastrocnemius a large abscess was opened, which contained a considerable quantity of grumous pus. The leg was so disorganized that no further examination could be made.

*March 29th*, 9 P.M.—Face flushed; pulse 105; temperature 100·8; respirations 38. Is free from pain or uneasiness, and has taken a fair amount of nourishment during the day.

*March 30th.*—An orderly sat with him last night, who reports, that he slept about 10 hours quietly; waking up now and then, and at once falling asleep again. He is free from pain this morning; pulse 100, somewhat weak; temperature in axilla 98·4; urine passed freely, sp. gr. 1019—it is free from sugar or albumen, reaction acid, it contains a slight cloud of mucus. Stump appears to be going on well, there is no unpleasant smell from it; dressed his bedsores which are still small and superficial. Bowels have not acted since the operation.

*March 30th*, 9 P.M.—Has taken three eggs beaten up with brandy, also a little light pudding. Pulse 100; somewhat weak; skin bathed in perspiration; temperature in axilla 98·6°.

*March 31st.*—Slept well last night, and is bright and cheerful this morning; tongue clean; skin perspirable; pulse 104, rather weak; temperature in

axilla 99·8. Passes his urine well, but his bowels have not yet acted. As a small quantity of sanious fluid was running from the stump, it was considered advisable to dress it. Stump appears healthy; the flaps, at the angles are apparently uniting by primary adhesion, at the extremity of the stump one of the wire sutures has ulcerated through, and the edges, for about two inches, are gaping; elsewhere an attempt at union appears to have been made. There was a little healthy pus on the edges of the wound, and no redness or sign of sloughing of any part. Altogether the state of the stump is very satisfactory; dressed with lint steeped in aqueous solution of carbolic acid, 1 part to 40; bedsores appear to be healing; painted with collodion. A simple enema was given, which was followed by free action of bowels; dejecta healthy.

*March 31st*, 9 P.M.—Has been pretty well all day, and has taken his nourishment satisfactorily. Half an hour ago he became very flushed and complained of being very hot. Skin feels hot and dry; pulse 120; temperature 100·8; tongue is somewhat dry.

*April 1st*.—Slept well during the night, being awake only half an hour. This morning he appears rather worn; skin warm but perspirable; pulse 108; temperature 99·2; tongue somewhat dry; complains of stiffness in the shoulders and elbows, but is free from pain. Slight blood-tinged oozing from the stump, unattended with unpleasant odour.

*April 1st*, 3 P.M.—Pulse 110; temperature 98.8°.

*April 1st*, 9 P.M.—Pulse 120; temperature 100·2; skin feels to the hand, burning hot, face flushed; tongue furred in patches.

*April 2nd*.—Slept badly last night, getting only about two hours' rest; looks worn and haggard; pulse 110; temperature 98·4°; passes his urine well but his bowels are confined. Takes his diet in the form of soup and the eggs beaten up with brandy. Stump again dressed; the angles of the flaps are firmly united, but the lower portion of stump shows but little signs of vitality; a second suture has ulcerated through and the edges are pouting. There is a large bulla over the posterior flaps, but as yet no actual gangrene. There is but little discharge from the wound, no gangrenous odour. Stump dressed with carbolic solution (1 to 30) on lint and a light bandage applied. Bedsores are healing.

*April 2nd*, 3 P.M.—Has taken his nourishment well, eating the greater part of his dinner; is quite comfortable; pulse 110; temperature 98·4°.

*April 2nd*, 9 P.M.—Face very flushed; skin dry and hot, imparting a thrill to the fingers; pulse 120; temperature 101°.

*April 3rd*.—Slept better last night, and states that he feels better this morning. Skin is bathed in perspiration; pulse 120; temperature 99°. Complains again of stiffness in the shoulders and left elbow; on examining the latter, its circumference is found to be an inch in excess of that of the opposite joint; between the external condyle of the humerus and the olecranon of the ulna there is an elastic swelling, communicating a deep-seated fluctuation; pyœmia has, it is feared, supervened, and there is probably pus in the joint; elbow supported on a soft pillow and enveloped in cotton wool; stump appears better; the upper portions of flaps remain united, and the gaping of the edges below is not greater than yesterday. A little pus exuded on the dressings and there are granulations on the flaps. Bedsores are healing; bowels not having been moved since March 31st a simple enema was used, which acted satisfactorily. I have to-day removed him to a larger and more airy ward, of which he is the sole occupant.

*April 3rd*, 3 P.M.—Has eaten his dinner fairly; pulse 116; temperature 97·8.

*April 3rd*, 9 P.M.—Pulse 114; temperature, 97·6.

*April 4th*.—Slept about 7 hours last night, and fancies himself better to-day. Skin cool; pulse 120; temperature 99·2. Elbow not more swollen than yesterday; only slightly painful to the touch; stump dressed; shows no sign of gangrene, granulations are springing up on the gaping edges, and there is a free discharge of pus. Upper angle of flaps still firmly united.

*April 4th*, 3 P.M.—Pulse 116; temperature 99·6; bowels have acted.

*April 4th*, 9 P.M.—Pulse 120; temperature 97·4; has taken nourishment fairly to-day. Complains this evening of a swelling in the left buttock about the size of a small hen's egg; this appears to be the early stage of an abscess; ordered a poultice.

*April 5th.*—Passed a good night; pulse 116; temperature 97·2°; tongue red and glazed, skin perspirable. Urine acid, quite clear, sp. gr. 1012, free from albumen or sugar; swelling of left elbow not increased, there is no pain in it unless the arm be moved. He keeps the arm semiflexed and is unable to straighten it. Swelling in buttock is not larger than yesterday; bedsores over the sacrum are healing; stump dressed with lint steeped in dilute solution of chlorinated soda (1 part to 16) in the absence of carbolic acid. A considerable amount of thick pus on the dressings and between the flaps; the granulations appear healthy, there is no sign of gangrene.

*April 5th*, 9·30 P.M.—Repeat iron and quinine mixture. Pulse 116; temperature 102°.

*April 6th.*—Slept well last night, is nearly free from pain this morning, save in the elbow joints. The swelling of the left joint is larger and more diffused, extending towards the external condyle; there is no swelling of the right joint; tongue red and shiny; pulse 120; temperature 99°; stump dressed, all the adhesions have given way, and as there was tension of the edges in the site of the sutures, I thought it best to cut and remove them. Interior of stump appears healthy and is covered with granulations; a free secretion of pus and no sign of mortification. The abscess in the buttock has burst, and is discharging healthy pus.

*April 6th*, 9·30 P.M.—Pulse 120; temperature 101°; paint elbow with tincture of iodine.

*April 7th.*—Slept well last night and has eaten his breakfast well. Tongue clean, not so red or glazed. Thinks the pain in his elbows is less; pulse 120; temperature 100°; abscess in buttock is discharging laudable pus; elbows as described yesterday; pain without swelling in right joint; considerable swelling of the left; joints enveloped in cotton wool and supported on soft pillows; stump covered with granulations, and discharging healthy pus; ligatures have not yet come away.

*April 7th*, 9·30 P.M.—Pulse 120; temparature 98·8°.

*April 8th.*—Slept well last night, and complains of but slight pain in the elbows this morning; their condition remains unchanged; pulse 120; temperature 99·4; tongue red and somewhat dry; skin perspirable; bedsores not increasing; abscess in buttock discharging but very little pus; stump studded with granulations bathed in healthy pus. There is a patch of sphacelus about 2 inches in length and one in depth on the posterior flap. Has eaten his breakfast well, bowels open; urine, sp. gr. 1010; reaction acid; quite healthy.

*April 8th*, 9·30 P.M.—Pulse 120; temperature 100·2°; paint the elbows with tincture of iodine.

*April 9th.*—Slept well last night and has eaten a good breakfast; skin cool; tongue rather red but moist; pulse 118; temperature 99·2°; stump covered with healthy granulations and secreting good pus. Sphacelus in posture flap is limited by a line of demarcation; there is a smaller patch of mortification on the anterior flap. Bedsores look healthy, and are not increasing in size; the abscess in the buttock being to-day very large, and the orifice being small, I incised it and evacuated about 3 ounces of thick pus; repeat poultices. Right elbow joint is less painful, its circumference is 9½ inches; left still painful, circumference 10¾ inches. A fluctuation is distinctly felt, paint with tincture of iodine and envelope in cotton wool.

*April 9th*, 9 P.M.—The discharge from the abscess has been very considerable during the day. He has vomited once this evening; bowels have acted naturally; pulse 112; temperature 99·6°.

*April 10th.*—Slept well last night and has eaten his breakfast fairly; pulse 112; temperature 97·6°. Elbows less painful; circumference of left 10 inches, swelling less prominent; sloughs on stump are separating favourably. Ligature in femoral came away this morning; bedsores healing; abscess in buttock discharging very slightly; his skin this morning has a somewhat jaundiced hue, and he appears worn and haggard.

*April 10th*, 3 P.M.—Appears very feeble; has eaten nothing since the morning, and is much troubled with flatus in the stomach; pulse 108, very weak, countenance very anxious; ordered soda draught.

*April 10th*, 5·30 P.M.—Appears to be getting rapidly worse; pulse is very

feeble, and his face is expressive of great anxiety; pulse 112, very weak; has voided some flatus since the draught, but is not appreciably relieved. Repeat at once.

*April 10th*, 9·30 P.M.—Pulse has greatly increased in frequency, it is now impossible to count it; it is very compressible; face is very haggard, and he constantly moves his head from side to side; the heart's impulse appears to be much diminished and the second sound is almost lost; no bruit is audible, I fear that he is running down rapidly; bowels have acted, motion pale and free from bile. To have two extra ounces of brandy, half an ounce to be taken at short intervals during the night; morphia draught at once and to be repeated at 1 A.M., if still restless.

*April 11th*.—Was quiet during the night and took the second draught.

*April 11th*, 5·40 A.M.—Slept for 5 or 6 hours; he is now dozing and very weak; pulse can be counted 120, thready.

*April 11th*, 10 A.M.—Has taken an egg beaten up with brandy and has rallied wonderfully; pulse 120 fuller; temperature 98·2; tongue red and glazed; skin more decidedly jaundiced and bathed in sweat. Both heart's sounds are distinctly audible, and a systolic bruit is heard at the apex. Urine sp. gr. 1024 of very deep colour and containing bile, showing the characteristic succession of colours with the nitric acid test. Swelling of left elbow has very much decreased, circumference 10 inches barely; circumference of right elbow 9 inches; stump looking very healthy and secreting good pus; sloughs are nearly separated; abscess of buttock is smaller; still discharges thick pus.

*April 11th*, 9·30 P.M.—Pulse 92, moderately full; temperature 98·4°. He appears comfortable, and has taken his diet in the form of soup.

*April 12th*.—Passed a good night, and appears better this morning, skin less yellow; urine contains bile but in smaller quantity; pulse 100; temperature 97·2°; tongue red but clean; skin cool and perspirable; has eaten a fair breakfast; one bedsore is quite healed, and the remaining sore is about the size of a shilling, rather deep, touched with solution of caustic (10 grs. to fl 3j water) and dressed with carbolized oil on lint. Abscess of buttock smaller, still discharging, repeat poultice; stump granulating well; sloughs have nearly separated, they are somewhat larger than described on the 8th instant: by their removal the end of the femur is left exposed and will probably exfoliate; repeat mixture 3 times a-day. Diet to be taken as soup.

*April 12th*, 9 P.M.—Pulse 104; temperature 99·6°. Bowels have acted twice to-day, motions of more healthy colour and containing bile; has taken his soup and extras fairly.

*April 13th*.—Slept last night for about 7 hours; has eaten his breakfast this morning; tongue clean: pulse 104; temperature 98·4°; urine still contains bile, but in less quantity; skin has a more healthy colour; stump looks well; posterior slough not quite detached; abscess in buttock discharges a large quantity of healthy pus; elbows less painful.

*April 13th*, 9·30 P.M.—Has taken most of his nourishment to-day; bowels have acted once, dejecta quite normal in colour and consistence; is rather more feverish to-night, pulse 110; temperature 100°.

*April 14th*.—Passed a good night, and has eaten a good breakfast; pulse 104; temperature 98·6; tongue clean, not too read; skin cool and of more natural colour; urine slightly bile-tinged; elbows freer from pain; left measures 10 inches, right 9⅞ inches; abscess in buttock is still discharging quite healthy pus; bedsore healing; stump looks healthy; sloughs have quite separated.

*April 14th*, 9 P.M.—Has passed a stool quite healthy in appearance and consistence; pulse 110; temperature 99·8°.

*April 15th*.—Slept well and ate his breakfast well; is perspiring very much this morning; pulse 108; temperature 99°; tongue clean; urine free from bile; stump looks very well; bedsore is healing; abscess in buttock is smaller and discharges less; elbows nearly free from pain.

*April 15th*, 9 P.M.—Bowels have acted once to-day; motions healthy; has eaten his food well; pulse 104; temperature 97°.

*April 16th*.—Slept fairly last night and has eaten a very good breakfast; pulse 96; temperature 98·4°; bedsore healing; abscess of buttock smaller, discharges less; elbows free from pain; stump looks healthy.

*April 16th*, 9 P.M.—Has eaten well, and has passed a healthy stool: pulse 98; temperature 98°.

*April 17th*.—Slept well last night and has eaten his breakfast; pulse 96; temperature 98°; stump looking well; bedsore healing; abscess in buttock smaller and discharging less.

*April 17th*, 9 P.M.—Pulse 96; temperature 98·2; bowels have acted once to-day; has eaten fairly.

*April 18th*.—Slept well; has not eaten much breakfast; pulse 96; temperature 98·4°; tongue clean; stump looks very healthy and is contracting rapidly; bedsore healing; abscess in buttock has ceased to discharge, and appears well; urine rather high-coloured.

*April 18th*, 9 P.M.—Has not eaten so well to-day; bowels have acted twice; pulse 110; temperature 98·6.

*April 19th*.—Passed a good night and has eaten a good breakfast; tongue clean; pulse 90; temperature 98·4°; bedsore nearly well; stump looks healthy; urine still high-coloured.

*April 19th*, 9 P.M.—Was allowed to sit up in bed this morning; has eaten well to-day, and says that he now feels very hungry; bowels have acted once naturally; pulse 92; temperature 98°.

*April 20th*.—Slept well last night and has eaten a hearty breakfast; pulse 92; temperature 98·4°; stump very healthy; bedsore nearly healed; urine normal; bowels open.

*April 20th*, 9 P.M.—Has sat up in an arm-chair by the fire for 1½ hours after dinner; weighs 7 stone 3½ lbs.; has eaten all his diet; pulse 96; temperature 98·6°.

*April 21st*.—Slept well and has eaten a good breakfast; pulse 92; temperature 99°; stump looks healthy; bedsore nearly well.

*April 21st*, 9 P.M.—Sat up for several hours during the afternoon, and has taken his nourishment well; bowels open; pulse 96; temperature 98°.

*April 22nd*.—Slept as well as usual last night and has eaten a good breakfast; tongue clean; bowels open; pulse 98; temperature 99°; stump is looking well; bedsore healing.

*April 22nd*, 9·30 P.M.—Somewhat feverish; pulse 100; temperature 98·4°.

*April 23rd*.—Slept well and has eaten well; pulse 100; temperature 98°; stump slightly swollen, and discharging thick grumous pus from the outer side; there was some blood on the dressings, and it appeared as if the stump must have been jarred or struck during the night; dressed with lint steeped in aqueous solution of carbolic acid, 1 part in 30; to keep his bed to-day.

*April 23rd*, 9 P.M.—Bowels have acted 3 times to-day; has taken his food; pulse 92; temperature 98°.

*April 24th*.—Slept well and has eaten well; pulse 100; temperature 98·6°; stump healthy; little or no discharge; ordered citrate of iron and quinine mixture.

*April 24th*, 9 P.M.—Pulse 86; temperature 98°.

*April 25th*.—Slept well; pulse 92; temperature 98·2; stump again discharging a little thick pus; bedsore healing; bowels have not acted since 23rd. Allowed up 1 hour.

*April 25th*, 9·30 P.M.—Pulse 84; temperature 98·2.

*April 26th*.—Slept well; pulse 100; temperature 98·4°; stump discharging a little thick pus from outer angle; granulations are contracting; end of the ferum is no longer visible; bedsores are healing.

*April 26th*, 9.30 P.M.—Bowels have acted twice to-day; pulse 96; temperature 99°; repeat draught.

*April 27th*.—Slept well; pulse 86; temperature 98; bowels open; stump healthy; bedsore nearly healed; weight 7 stone 10 lb.

*April 27th*, 9·30 P.M.—Bowels have acted 3 times to-day; pulse 92; temperature 98·4°.

*April 28th*.—Slept well; pulse 96; temperature, 99·2°; tongue clean; stump looks very healthy; bedsore nearly well.

*April 28th*, 9·30 P.M.—Pulse 96; temperature 99°.

*April 29th*.—Slept well; tongue clean; bowels open; pulse 96; temperature 99; stump and bedsore healthy.

*April 29th*, 9·30 P.M.—Pulse 96; temperature 99°.

*April 30th.*—Slept well; bowels have acted twice this morning; pulse 80; temperature 97·4°; examined the heart, the area of præcordial dulness appears somewhat increased in a direction downwards; there is dulness on percussion for a space of three inches below the left nipple; a soft systolic bruit is heard at the apex; stump looks healthy; bedsore is hardly larger than the section of a horsebean; patient is putting on flesh rapidly.

*April 30th*, 9·30 P.M.—Pulse 85; temperature 98·6°; bowels have acted 3 times since the morning visit.

*May 1st.*—Slept well; bowels have acted once naturally this morning; pulse 90; temperature 98·6°; tongue clean; stump healthy; bedsore nearly healed.

*May 1st*, 9·30 P.M.—pulse 85; temperature 98°.

*May 2nd.*—Slept well; pulse 90; temperature 98·6°: tongue clean: bowels open; stump healing rapidly, only about 3 inches remain uncicatrized; bedsore nearly well.

*May 2nd*, 9·30 P.M.—Pulse 85; temperature 98·6°.

*May 3rd.*—Slept well; pulse 85; temperature 98·4°; tongue clean; bowels open; bedsore healed; stump healthy.

*May 3rd*, 9·30 P.M.—Pulse 85; temperature 98·4°; is sweating very profusely.

*May 4th.*—Slept well; pulse 90; temperature 98·8°; tongue clean; bowels open; weight 8 stone 2 lbs.

*May 4th*, 9·30 P.M.—Pulse 80; temperature 99°.

*May 5th.*—Slept well; tongue clean; bowels open; pulse 85; temperature 98·4; stump closing in rapidly.

*May 5th*, 9·30 P.M.—Has sat outside in an arm-chair for an hour to-day; pulse 85; temperature 98·5°.

*May 6th.*—Perspired profusely during night, but slept well; pulse 88; temperature 98·4°; to be sponged this evening with tepid dilute nitro muriatic acid lotion.

*May 6th, 9·30* P.M.—*Pulse 85; temperature 98·4°; is perspiring less to-night.*

*May 7th.*—*Slept well; tongue clean*; bowels rather relaxed; pulse 84; temperature 98·4; stump healed, save over the spot corresponding with the extremity of the femur and site of the sphacelus, here the granulations are rather luxuriant; touch with 5 grains solution of caustic and apply water dressing; repeat acid lotion at night.

*May 7th*, 9·30 P.M.—Pulse 85; temperature 98·4°.

*May 8th.*—Stump looks well; pulse 85; temperature 38·4°; slept well last night and did not perspire so much.

*May 9th.*—Pulse 85; temperature 98·4°.

*May 9th*, 9·30 P.M.—Pulse 84; temperature 98·4°.

*May 10th.*—Slept well, and did not perspire at all; tongue clean; bowels open; pulse 84; temperature 98·4; stump is rapidly healing.

N.B.—Morphia draughts were given at bedtime, in varying strengths, nearly every night during progress of case, and alteratives, sedatives, and tonics administered as symptoms arose.

*Remarks.*—This case possesses, I think, some interest in a practical point of view,—adding as it does one more instance to the at present not very extended list of favourable issues to amputation in this form of gangrene.

My nomenclature will very possibly be objected to, and the disease may be regarded as an example of arterial embolism, by the detachment of a fibrinous clot from the mitral valve, a not infrequent sequela of acute rheumatism. I hesitated before returning the case as Thrombosis, but having been unable previously to detect any cardiac complication, or irregularity, I felt that the embolism could, at best, be but conjectural, and that the balance of evidence lay in favour of the former heading. I was influenced in this decision by the fact, that on the day preceding the attack (which I have considered as the first of his disease) his symptoms were those of exhaustion, expressed by a decided failure of the heart's action, and intermittent pulse; passive congestion of the lungs co-existing:—conditions which would certainly favour a stasis of blood in the extremities. Moreover it appeared that a mere impaction of an embolus in the popliteal artery could scarcely account for the extreme rapidity with

which the symptoms of gangrene appeared after the diagnosis of his condition was arrived at. In terming the case "Thrombosis of Popliteal Artery," I have not intended to imply that this vessel was from the first plugged (the examination of the amputated limb negatives this), but merely to define the limits to which the occlusion subsequently extended. The intermission of the pulse on the 2nd of March, must have depended on some temporary cause, as it was not again observed during the course of his disease. No cardiac bruit was detected at this time, nor until the 25th of the month, when a slight systolic murmur was heard at the apex, which has persisted to the present date, and may possibly be connected with his anæmic condition. It is remarkable that in this, as in the parallel case of Private E. J., Cape Mounted Rifles, detailed by me in the "Lancet" of January 22nd, 1870, the first and chief complaint of the patient was of a feeling of icy coldness in the limb, and from this symptom a diagnosis of his disease was at once arrived at.

I regret that I was unfurnished with a clinical thermometer at this date, so that I am unable to furnish readings prior to the 24th day.

The remote causation of the thrombosis is uncertain; the patient, though somewhat thin and anæmic, did not appear prematurely aged, either by disease or excesses. He had never suffered from venereal taint, and with the exception of one previous attack of acute rheumatism, had always enjoyed good health. His late illness had been by no means severe or protracted, and at the time of the onset of the first symptoms of thrombosis, he appeared almost convalescent. During the course of his illness nothing peculiarly unfavourable in his condition was remarked for the first 21 days; on the 22nd day signs of septic poisoning appeared, the pulse rising from 85 to 110 beats per minute and a pungent heat of skin being felt. These untoward symptoms increased in severity until the 28th day, when it was evident that, unless the gangrenous limb was at once removed, death must inevitably follow at no distant date. The patient was seen by several surgeons, and a most unfavourable prognosis was always given, however, having witnessed a recovery in an equally unfavourable case, I clung to the hope that, on the removal of the cause, the effect might possibly disappear also, and this happily has been justified by the result.

After the operation, a lull in the symptoms of pyæmia occurred for three days; on the evening of the third day the pulse was 100, temperature 98·6°. On the 4th evening, however, the characteristic exacerbation occurred, the pulse being 120; temperature 100·8°. A slight remission was observed on the 5th morning, followed by the exaltation in the evening. On the 6th evening the temperature was 101°, and on the following morning a threatening for suppuration in the elbow joints was observed. On the 8th day the morning temperature was higher, and the pulse quicker than on the preceding evening. On the 9th evening the highest reading of the thermometer was obtained (102°, pulse 116); the following morning the pulse rose to 120, but the temperature was lessened, a secondary abscess had burst in the left buttock. On the 12th day partial mortification of the flaps of stump occurred, from this date the evening exacerbation was not so well marked.

The comparatively low degree of evening temperature recorded during the presence of pyæmia is explicable thanks to the recently published lectures of Dr. Parkes on the excretion of Nitrogen; it was no doubt in part owing to the profuse action of the skin and partly to the slightly increased amount of urea in the urine. The amount of urea was not estimated, but that it could not have been high is evidenced by the comparatively low specific gravity of the urine. This only once (and at a time when extreme waste was going on) reached 1024—whilst on other occasions it was only 1010—the usual reading being 1013.

In conclusion I have merely to add that the patient is now so far recovered that he is able to be out of doors for several hours daily, and that he is rapidly putting on flesh. The extremity of the bone which was laid bare by the sphacelus will probably exfoliate and require removal; had this not occurred he would have had an excellent stump, and as it is I believe that he will have a very serviceable one. It is healed everywhere save on the site of the former sphacelus for a space of, perhaps, 2 inches. Altogether I consider the issue of the case very satisfactory, and coupled with my previous successful case already

referred to, it offers, I think, a strong argument in favour of amputation in suitable cases of gangrene arising from arterial occlusion.

*May 10th.*—This day transferred to Assistant-Surgeon Whipple, M.D., Coldstream Guards.

On 7th June Mr. Whipple reports "the stump has almost completely "healed, though it is still tender to the touch and there is no sign of any portion "of the end of the bone exfoliating. Patient has gained 16 lbs. in weight, and is "to be sent to Regimental Hospital to-morrow to be invalided."

10. *Case of supposed Ocular Disease. By Deputy Inspector-General T. Longmore, C.B., &c., &c..*

The following case, in which a natural condition of the eye was mistaken for a morbid one, and in which the mistake led to prolonged unnecessary anxiety and suffering, may be worth placing on record.

I was asked to see a young woman who was said to be suffering from a weakness of sight that had not been benefited up to that time by any of the treatment she had received for its cure. The patient, who was 20 years of age, of spare delicate frame, whose bodily functions were stated to be regular, assisted her mother in keeping a school. She gave me the following history of her ailments.

Two years previously, in Guernsey, where she was then living, she one day noticed that she was unable to see part of an object which she happened to be looking at with her left eye. Her attention being directed to the subject by this accident, she found she never could see the whole of any object with this eye. At church she lost sight of part of the clergymen in the pulpit, and in a similar way some part of all other objects which she turned her eye upon were unperceived by her. She soon afterwards noticed that on looking fixedly at any article in a room, such as a picture on the wall, with this eye, the article itself speedily faded from her view, especially in a dull light, while other persons whom she questioned could continue to see the same object distinctly. Sometimes all the objects round a particular spot she was looking at would disappear from her sight, while the object itself remained in view. These symptoms continued up to the time of her describing them to me; they had gradually become rather worse then better; she never looked at any object now at a little distance from her without part of it being invisible. At no time had she met with any blow or injury near the affected eye. She had had an attack of fever about a year before she first became aware of the defect in her sight, after which she was subject to occasional headaches, especially about her forehead, and attacks of dizziness. These attacks were more frequent and troublesome about the time she noticed the affection of the eye just described. The sight of her right eye was also weak, but not so bad as that of the left eye.

For these symptoms she was treated by a medical practitioner in Guernsey, who told her she was suffering from congestion of the nerve of the eye. He prescribed certain medicines, blistering, and ointments behind the ears, and enjoined her to use her eyes as little as possible, especially at fine work.

As no benefit followed the course of treatment, at the end of a year she was recommended by her medical attendant to go to London to consult an oculist. On reaching London she attended, as an out-patient, one of the large ophthalmic hospitals; where, according to her own account, she was told she was very nervous, and that she would probably get all well again as she grew stronger. She showed me some of the prescriptions which had been ordered for her, and these chiefly consisted of tonic medicines.

The description she had given me of her symptoms led me to fear the existence of some amaurotic amblyopia. The replies she gave to my questions afforded no ground for suspecting there was any retinal detachment. I made an examination of the left eye with the ophthalmoscope, but could not detect any abnormal appearance of the fundus. On determining the refractive condition of the eyes, I found them both to be very slightly myopic, about M. $\frac{1}{8}$; I could not, however, to my surprise find any evidence of amblyopia, 1½ Snellen being read by each eye without any difficulty.

I was now about to take the field of vision, but before doing so in the usual way, and still without the real source of the disorder complained of having occurred to my mind, I placed her in front of some bookshelves with a view to ascertain from her own description the part of the field of vision where objects were not perceptible by her. Causing her to fix her left eye on the title of a certain book, I got her to point out to me what other books in the neighbourhood she was unable to see. These she at once indicated. Varying her distance from the shelves, I noticed that the blank was always to the left of the point on which the gaze of her left eye was fixed, and was always at a similar angle, one of about 15 degrees, with the line of direct sight. I at once saw that this agreed with the direction in which rays reflected from the unseen objects would fall on the optic nerve entrance, and placing myself in the same position in which the patient had stood, I easily confirmed the matter beyond doubt by personal observation.

On now making closer enquiry respecting the manner in which she had first discovered this supposed defect of vision, she told me it was by finding herself able to see only seven, and sometimes only six, out of eight white handles on a chest of drawers which were in her bedroom. I explained to her that this was only a natural condition which existed in every person's eye, and by employing an old experiment, viz., putting some red wafers on the wall, and placing her at a certain distance in front of them, demonstrated that one or other disappeared from view according as her right or left eye was covered. I also tried to convince her that no one can look intently on a particular spot, with the eyes kept motionless, for more than a few seconds together, without that spot becoming shadowy and indistinct. She left me, however, very reluctant to believe that what had caused her so much concern for so long a time could be otherwise than some weakness of vision peculiar to herself, and her manner caused me to doubt very much whether my advice to her to abstain, as far as possible, from dwelling on the points which had so attracted her notice would be followed.

The explanation of this case was quite clear. Having accidentally discovered "Mariotte's blind spot" in the manner described, her fancy had dwelt constantly upon the phenomenon, and by frequently looking at objects with her left eye for the purpose of observing it particularly, she had not only fixed it permanently on her notice—the negative blank becoming a positive spectre—but she had also been brought to observe some other physiological phenomena, more especially the inability of the eye to maintain a sustained vision of objects which are looked at intently.* These isolated facts, moreover, had attracted her attention, without her mind being led to discover the means by which they are compensated and prevented from becoming sources of inconvenience to vision in general. The headache, sense of fulness in the eye, dizziness, and other symptoms with which she surrounded her observations were probably in great measure illusory, or were exaggerated by a nervous temperament, and by the fact that her mind was constantly dwelling on her supposed ailments. The concentration of her thoughts upon her imaginary disorders had been facilitated by her enforced abstinence from needlework and other like occupations.

Those who have read the effect of fancy on the mind of Sir Isaac Newton, as described by himself to Locke, in fixing the impression on his retina of the sun's image after looking at it for a short time, when reflected from a looking glass, and the difficulty he experienced for several months in ridding himself of the retinal impression whenever his fancy reverted to the subject,† may well understand the persistence of the effect of discovering the blind spot of the eye, and the distress occasioned by it, on a young person of apprehensive and nervous

* This subject, the vanishing of an object upon which the eye is steadily directed, has been very fully considered by Sir Charles Bell, in the Appendix to his celebrated Bridgewater Treatise on the Hand. *See* his remarks on "a comparison of the Eye with "the Hand" in this treatise.

† The letter of Sir Isaac Newton to Locke, dated Cambridge, June 30th, 1691, in which the very curious circumstances alluded to above are fully described, may be seen in Sir D. Brewster's "Life of Newton," in the "Family Library," ch. 17, p. 281, and is cited in various works relating to the science of vision.

temperament who was ignorant of the nature of the phenomena thus accidentally brought to her knowledge. The trouble of Sir I. Newton depended upon a prolonged and intimate association of the ideal faculty with a luminous image which in the commencement had been actually impressed, and probably to an excessive extent, on his retina, so that the treatment had to be partly ocular and partly mental; in the case of the patient just described, no disorder had existed, or did exist, but what was mental, and the only remedies calculated to lessen or remove the mischief would be necessarily such as would also act through the mind.

11. *Case of Development of Larvæ in the Nasal passages. By Staff-Assistant Surgeon W. K. Stewart, M.D.*

Serjeant D., 2nd Battalion 60th Rifles, married, age 40; service 20 years. An invalid on his way home on account of anæmia, the result of malarious fevers and climate; was admitted into the General Hospital at Deolallee, E.I., on the 3rd January, 1871. There was no history of syphilis. The following note of his case was taken on the 11th of that month.

"Patient's appearance betokens malarious poisoning. His skin is rough "and dry, and he is rather emaciated; he is weak; appetite indifferent. It is "difficult to obtain any information from him as he appears to be of a pecu-"liarly listless and reserved disposition."

About the 20th he complained of pain in the loins with a frequent and uncontrollable desire to micturate; spec. grav. of urine 1031, slightly alkaline, contained no albumen.

From the 24th to the 30th January his mind wandered a good deal, and he talked incoherently. During the greater part of this time he could, with difficulty, be prevailed on to take any nourishment, often spitting out his wine and beef tea after taking them into his mouth. Obstinate constipation of the bowels was a prominent symptom during this period, as indeed it was through his whole illness. During all this time there was not the slightest constitutional disturbance, and the tongue remained clean.

He gradually continued to improve till the 5th of February, when there was a slight relapse, and the right knee, which was the seat of ch. synovitis, was more than usually painful. After this, his general health went on improving and he got so well that for several mornings he got up and walked to the ablution room and washed his hands and face himself, but the knee getting worse he was confined to bed again, where he would lie, taking very little notice of anything that went on in the ward around him, and seldom of his own accord changing his position in bed. Sometimes he would ask for the urinal, at other's he would not, but allow his urine to flow on the bed. During this time he was sensible enough, though he took a long time to answer questions, and his intellect seemed to be very sluggish.

On the 24th February it was noticed that his nose was red and swelled, and by the "morning visit" next day the whole of the lower part of the face was involved and both eyes closed. Great pain was complained of. In the evening the left side of the nose was very red, and there was a profuse discharge of dirty grumous matter from the nostrils, especially the right.

On the afternoon of the 26th several maggots escaped from the left nostril, and by the "morning visit," next day, about two dozen had made their escape through the nostril, and through two openings in the integument on the left side of the nose. The patient was now very weak, and suffered from high irritative fever. He got rapidly weaker and the larvæ continued to be discharged, and picked out daily.

*March 1st.*—Very weak; teeth and gums covered with sordes. Another opening through the skin over the bridge of the nose was made by the larvæ yesterday, and about 22 came away during the day. The nasal bones are falling in.

*March 2nd.*—Weaker; passed a restless night; the bridge of the nose has fallen in, and there is more swelling over the forehead.

*March 3rd.*—Rested very badly; face more swollen. Several new openings have been made on both sides of the face; very weak. Took a fair amount of nourishment yesterday.

*March 4th.*—Sinking; moaning constantly; a great many more larvæ have come away since last report. Their numbers seem to be endless.

Died about 10·30 A.M.

The *General Treatment* of the case consisted of ammonia, brandy, wine, eggs, and beef tea, with an occasional opiate at bedtime.

The *Local Treatment* consisted of injections of saturated solutions of common salt, liq. sodæ chloratæ in water, sp. terebinth (pure) and a native remedy consisting of the following ingredients, decomale (a resin, procured from gardenia lucida and g.—gummifera) ʒi., camph. ʒi., ol. oliv. ʒii., mix and boil. When cold, a portion was frequently injected. This last brought away a good many larvæ after each injection, but none of them were dead. On the difficulty of destroying these larvæ I shall have occasion to remark further on.

Attempts were made to plug the posterior nares, with the view of preventing the escape of fluids into the pharynx, but this was found to be impossible from the great swelling of the parts and the patient's inability to open his mouth widely.

*Extract from the Post Mortem appearances four hours after death.—Body* not much emaciated; the whole of the face was very much swelled; nose flattened and exhibiting numerous perforations, surrounded by a livid appearance of the integument. The tissues of nose and face were found infiltrated with serum, and numerous canals existed in the soft parts, in which living lavræ were found crawling. These canals extended to considerable distances in all directions, one reached the socket of the left eye-ball but did not penetrate the structures of that organ, others extended laterally through the soft parts of both cheeks, and superiorly, for a short distance, in the soft parts of the forehead. Living lavræ were seen in all of them.

The nasal bones, upper surface of the palate bones, and the inferior aspect of the ethmoid, were denuded of periosteum, and covered with a blackish, offensive, putrid substance.

The turbinated bones were in great part destroyed. The frontal cells were free from larvæ. No communication with the encephalon was discovered.

*Heart*, healthy; right ventricle contained a large firm straw-coloured clot. Aorta was the seat of atheromatous disease. Lower part of the left lung posteriorly was very much congested and adherent to the parietes of chest. On making a transverse incision through its substance one or two small specks of a puriform fluid exuded.

*Liver*, large and slightly fatty.

*Spleen*, of normal size and structure.

*Kidneys*, healthy.

*A few Remarks on the Appearance of the Larvæ.*—When first seen on their escape from the nose they were about half an inch in length, of a dirty white colour, inclining to brown. Very active, having ribbed markings, and furnished at the smaller end with a very fine double hook of a black or dark brown colour.

The toughness of their coats and their almost absolute immunity (for a long time at least), in substances which prove speedily fatal to the larvæ of the ordinary domestic fly, are suggestive of their being a different species.

With a view to find out the best agent for their destruction the living larvæ were placed in solutions of the following substances, made as strong as would be advisable to inject up the nose (1) sol. carbolic acid; (2) sol. chlor. zinci; (3) sol. hyd. bichlor; (4) sol. chlor. ammon.; (5) sol. chlor. potass; (6) tinct. ferri perchlorid in water; (7) Condy's fluid (pure); (8) saturated sol. of common salt; (9) ol. terebinth and ol. copaib, equal parts; (10) lime water; (11) black wash; (12) infus. quass.; (13) chloroform; (14) sulph. ether; (15) spirit of camphor; (16) infus. of tobacco leaf gr. iv ad ʒi aq.

Of all these substances the saturated solution of common salt had the most effect; but none of them seemed to exercise a *permanent* effect on the larvæ. Although after some time in chloroform they seemed to die, yet on being taken out they became quite lively.

From these and other experiments I have instituted, I have arrived at the conclusion that a remedy which will effectually kill them *at once* without destroying the soft structures of their *host* has yet to be discovered.

This affection is sometimes met with in this country among natives and

Europeans. Cattle are likewise affected with it. Camel men and those employed much among animals are said to be peculiarly liable to it.

Among the natives it receives the name of "peenash," but as this seems to include any discharge, the result of disease from the nostrils, the name is not very diagnostic.

Cases have been, from time to time, published in the Indian Medical papers, but as in the only one I have read on the subject,* ordinary "blue bottle" flies were produced from the larvæ, after undergoing the usual transformations, and the patient recovered after a few injections of carbolic acid, I believe the larvæ not to have been of the destructive nature met with in the case now detailed.

A large grey fly of about the same size as the ordinary "blue bottle" is, I believe, the parent of the species of larvæ now under consideration. It brings forth its offspring alive and active. This was first brought to my notice by Staff-Assistant Surgeon W. Sharpe, M.D., who caught several of these flies and fed the larvæ, which, in about three days, attained the size, and, as far as could be judged by the unaided eye, resembled in every particular those that came from the patient.

I preserved specimens of the larvæ which came from the patient and placed them in some dry earth in a bottle. In a day or two they assumed the chrysalis form. The first *grey fly* made its appearance 20 *days* after this transformation, the last one on the 14th April, considerably more than *a month* after the formation of the chrysalis.

The larvæ of the "blue bottle" fly, after assuming the pupa form, produced flies in about 10 days.

Through the kindness of Professor Parkes, I have been favoured with a perusal of Mr. Busk's opinion of the fly from a specimen forwarded by Dr. Sharpe.

Mr. Busk says the fly is sarcophaga ruficornis—a well-known Indian species. He was unable to learn much about its life or history, and could find no reference to its injurious effects upon man. He also states that M. Latrielle (Règne Animal, vol. iv), under the genus, sarcophaga, mentions that in that genus, the female, at any rate in some species, is viviparous.

In Orr's "Circle of the Sciences," vol. ii, page 374, I find it stated of a member of the same genus, sarcoph. carnaria, "the eggs are hatched "within the body of the mother, and the insects make their first appear-"ance in the larva form."

I believe that this fly, the sarcophaga ruficornis, is widely distributed over India. I think I have seen it at Laudour, in the Himalayas, at a height of considerably over 7,000 feet above the level of the sea.

From what I observed in this case, and in the experiments conducted in breeding the flies, I am inclined to believe that a person in a state of sound sleep, or unconsciousness, lays himself open to the attacks of the fly, more especially if there be any ulceration or open sore on the exposed parts of his body, as I found that a piece of tainted meat very soon attracted several flies, and they were very bold in their endeavours to reach it.

In the patient there was no previous disease of the nose noted.

I think that after a certain time, the larvæ, on attaining a particular stage, cease their carniverous habits, and desire to quit their abode and retire to some other place to take on the pupa state.

Before this takes place, however, the patient will, in all probability, have succumbed.

The only remedy likely to be of service would be to cut down and pick out the larvæ, though, when the nasal passages are affected, the hopelessness of a cure in this way will be evident.

N.B.—Since the above was written I have read of another case occurring in a Native, which, in several particulars, resembled the one now detailed.

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* A case of "peenash," by Dr. Higginson, Civil Medical Officer, Gondah, detailed in the "Indian Medical Gazette," 1st August, 1870.

## APPENDIX No. XVI.

## MEMORANDUM ON THE HYPODERMIC INJECTIONS OF MORPHIA.

By Professor Maclean, C.B.

The following question formed part of the examination paper on medicine for Assistant-Surgeons for 1872.

3. *What are the diseases in which the subcutaneous injection of morphia is most useful? What are the inconveniences and dangers to be guarded against in the use of this remedy, and what is the strength of the solution you would employ?*

Many extremely good answers to this have been received, but in almost all the replies the quantity of morphia is dangerously high. In some papers half a grain is mentioned, and in one a grain is suggested as the proper quantity to begin with. The first is highly dangerous, the second would almost certainly be fatal, particularly if used on a man with a weak or damaged heart.

At Netley the gravest symptoms have been known to follow a first injection of less than a quarter of a grain, and it is now a standing rule that in no case shall a first injection of any preparation of morphia exceed one-sixth of a grain. Still further to impress the necessity of caution in the use of this remedy, I may mention that death, in civil life, recently followed the hypodermic injection of considerably less than half a grain of the acetate of morphia.

To add one other caution; the terrible bondage is known into which a man enters who is once enslaved by opium eating. I incline strongly to the opinion that a craving for this drug is more quickly established under its hypodermic use than when it is taken by the mouth. From some distressing examples that have lately come under my observation, I am certain that much circumspection is needed on the part of medical men in the use of morphia by hypodermic injection, to obviate the consequences of unguardedly establishing a craving for the drug.

## APPENDIX No. XVII.

### THE ALEXANDER MEMORIAL FUND.

The subject for the next prize essay is—

"The nature and varieties of destructive lung disease included under the "head of '*Pulmonary Consumption*,' as seen among soldiers, and the hygienic "conditions under which they occur. To be illustrated, as far as possible, by "cases drawn from the personal observation of the author."

The essay to be legibly and clearly written, superscribed with a brief motto, and accompanied by a sealed envelope, similarly superscribed, containing the name and address of the author.

Essays to be despatched to the President, Alexander Memorial Fund Committee, Army Medical Department, 6, Whitehall-yard, on or before the 31st December, 1872.

The competition to be limited to Executive Medical Officers of the Army on full pay.

The relative merits of the essays to be determined by Assessors to be selected by the Committee.

The prize to be awarded to the best essay offered without reference to the number of competitors, provided the writer has complied with the prescribed conditions.

## APPENDIX No. XVIII.

## ARMY MEDICAL SCHOOL, NETLEY.

THE 21st Session, or Winter Session, of 1870–71, was attended by 8 Surgeons, 22 Assistant-Surgeons of Her Majesty's British Service, and 2 Surgeons of the Indian Medical Service, whose names appear in the List which follows.

No candidates for commissions in either the British or Indian Medical Services were present.

Fifteen of the Assistant-Surgeons went through their examination for promotion at the close of the session.

**Medical Officers who attended the Army Medical School at Netley during the Winter Session 1870–71.**

| Name. | Rank. |
|---|---|
| Shipton, J. N.. .. .. .. | Surgeon, 2nd Battalion 2nd Foot. |
| Pollard, W. H. .. .. .. | ,, 2nd ,, 22nd ,, |
| Alder, S. .. .. .. .. | ,, 34th Foot. |
| O'Nial J. .. .. .. .. | ,, 51st ,, |
| Erskine, J. L... .. .. .. | ,, Royal Engineers. |
| Martin, C. .. .. .. .. | ,, Staff. |
| Turner, J. A. .. .. .. .. | ,, ,, |
| Elliott, A. F... .. .. .. | ,, ,, (African Service). |
| Williams, J. P. .. .. .. | ,, Madras Army. |
| Farrell, G. .. .. .. .. | ,, Bengal Army. |
| Fuller, S. .. .. .. .. | Assistant-Surgeon, 4th Hussars. |
| Rudd, T. .. .. .. .. | ,, 2nd Dragoons. |
| Clarke, A. F. S. .. .. .. | ,, Royal Artillery. |
| Murray, J. R... .. .. .. | ,, ,, |
| Alston, W. E... .. .. .. | ,, ,, |
| Welch, F. H. .. .. .. .. | ,, 1st Battalion 22nd Foot. |
| Gillespie, F. .. .. .. .. | ,, 33rd Foot. |
| Grant, R. A. P. .. .. .. | ,, 43rd ,, |
| Owen, O... .. .. .. .. | ,, 50th ,, |
| Everet, W. .. .. .. .. | ,, 57th ,, |
| Jazdowski, B. J. .. .. .. | ,, 93rd ,, |
| Archer, S. .. .. .. .. | ,, 98th ,, |
| Carlow, J. .. .. .. .. | ,, 101st ,, |
| Bennett, T. .. .. .. .. | ,, Staff. |
| Hoysted, T. N. .. .. .. | ,, ,, |
| Wall, W. R. .. .. .. .. | ,, ,, |
| Walker, H. .. .. .. .. | ,, ,, |
| Roe, E. A. H... .. .. .. | ,, ,, |
| Seward, T. .. .. .. .. | ,, ,, |
| Footner, E. .. .. .. .. | ,, ,, |
| Waters, J. M... .. .. .. | ,, ,, |
| Oughton, T. .. .. .. .. | ,, ,, |

## EXAMINATION OF ASSISTANT SURGEONS FOR PROMOTION.

Held at the close of the 21st Session.

### A. Written Examination.

#### I. Pathology.

1. What are the conditions under which fibrinous deposits are found *post mortem*? What are the situations (organs, cavities, or blood vessels) where such deposits are most commonly found? What may be the result (local and general) of the formation of such deposits during life?

2. Name the bones of the human body which are incomplete at 18 years of age, and state in what respect they are incomplete.

3. A case of extensive cystic disease was admitted on the 6th August, and died on the 28th November. What were the positions and anatomical relations of the cysts as seen at the *post mortem* examination? What did the cysts contain? Give your opinion as to the probable origin of such cysts.

#### II. Military Hygiene.

1. How is a soldier to be kept healthy on the march? What are the chief diseases to be apprehended on a long march from foul water, unhealthy encampments, exposure to weather or sun, over-marching, and under-feeding?

2. Why is so much importance attributed to the amount and changes in the subsoil or ground water? Discuss some of the points connected with this question.

3. What are the opinions now generally held as to the respective merits of clarifying sewage by precipitating chemical agents, or by the application to land? Under what circumstances would you recommend the dry system of disposal of sewage in preference to irrigation?

#### III.—Military Surgery and Surgical Anatomy.

Question 1:

(*a*.) Give a sketch of the various circumstances which affect the consequences of gun-shot fractures of bones, and of wounds of joints of the extremities under the ordinary conditions of warfare.

(*b*.) Mention the consequences which these circumstances tend to produce.

(*c*.) Contrast the treatment which a knowledge of such liabilities would lead you to adopt in the field, with the treatment you would resort to in corresponding injuries under the usual conditions of practice in civil life.

(*d*.) Illustrate your replies to (*a*), (*b*), and (*c*), by examples of any two wounds you may choose to select, one being a wound of a joint, the other a fracture of the shaft of a bone, by gun-shot, in either the upper or lower extremity.

Question 2:

(*a*.) Explain the significations of emmetropic, myopic, and hypermetropic vision.

(*b*.) Upon what do these different qualities of vision depend?

(*c*.) Give an example of the mode of detecting the existence of myopia, and of determining its degree, by means of a 10-inch convex lens.

Question 3:

(*a*.) Describe the operation of exercising the elbow-joint by single straight incision in the ordinary method.

(Memo.—Each step of the operation must be distinctly described. The several structures divided are to be named).

(*b.*) What muscles and other structures divided by the ordinary method are left undivided when the same operation is performed sub-periosteally?

(*c.*) Name the anatomical structures not cut in excision of the joint, which would be divided if amputation were performed a hand's breadth above the joint instead.

### IV. Military Medicine.

1. What are the diseases of the heart and great vessels to which soldiers seem most liable? What are the causes, constitutional and physical, which appear to produce them?

Describe:—

(*a.*) The symptoms of aneurism of the thoracic aorta, with a physiological explanation of each symptom in detail.

(*b.*) The same of aneurism of the abdominal aorta.

2. It is reported from the seat of war, that German army surgeons treat dysentery "by opium, tannic acid, morphia, calomel, and various remedies for "allaying pain."

Comment on this mode of treatment. Show what appear to you to be its advantages and defects, if any, from a careful consideration of the method of treating this disease in India of late years.

3. The subcutaneous injection of morphia to allay pain being now an established method, give the details of the operation, the class of cases in which it is most useful, the strength of the solution you would employ, the dangers and inconveniences to be avoided.

## B. Practical Examination.

### Pathology.

1. Examine the portions of tissue placed in the dishes. State of what organ each is a part, and describe its morbid condition.

2. In the preparations numbered 1, 2, 3, 4, 5, and 6, define anatomically what parts are shown, and describe the lesion or lesions which are illustrated in each.

3. Determine the magnifying power of any one of the microscopes, and append the scale used.

4. Describe and name generally what you see in the fluid contained in the test-tubes, examined under the highest power.

5. Name each of the preparations placed under the microscopes on the table.

### Military Hygiene.

1. Examine the sample of water before you,—as much as can be done in the time.

2. Examine the contents of the packet before you, chemically and microscopically.

3. Read the meteorological instruments before you, and apply the necessary corrections.

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The 22nd Session of the Army Medical School, held during the Summer of 1871, was attended by 36 candidates for commissions in the Army Medical Service, and 17 Assistant-Surgeons of the Royal Navy.

Surgeon E. Sexton, Indian Medical Service, also attended the course.

The order of precedence, determined by the combined results of the examinations at London and Netley, and the total number of marks gained by each candidate for the Army Medical Service in the two examinations are shown in the list which follows.

The Herbert Prize was gained by Mr. A. Crombie.

A Pocket Case, presented by the Director-General, as a prize in operative surgery, was awarded to Mr. G. B. Stuart.

TWENTY-SECOND SESSION, SUMMER 1871.

Combined results of the London Examination in February, and at Netley in August 1871, for candidates for the Army Medical Service.

| Order of Merit, as finally settled. | Names. | Total Number of Marks (Maximum, 6,900). | Order of Merit, as finally settled. | Names. | Total Number of Marks (Maximum, 6,900). |
|---|---|---|---|---|---|
| 1 | Crombie, A., M.B. | 5,965 | 19 | Molloy, O. .. | 4,145 |
| 2 | Stuart, G. B., M.B. | 5,775 | 20 | Moylan. W. J. .. | 4,120 |
| 3 | Irving, L. A. .. | 5,335 | 21 | Exham, R. .. | 4,056 |
| 4 | McCracken, J. A. M.D. .. .. | 5,320 | 22 | White, W. L., M.B. .. .. | 4,016 |
| 5 | Beamish, J. M., M.D. .. .. | 5,150 | 23 | McNamara, J. M.D. .. .. | 4,013 |
| 6 | Clery, J. A., M.B. | 5,060 | 24 | Harman, R., M.B. | 3,980 |
| 7 | Cruikshank, B., M.B. .. .. | 5,040 | 25 | Wilson, J. B., M.D. .. .. | 3,860 |
| 8 | Coats, J., M.B. .. | 5,005 | 26 | Leak, G. D. N. .. | 3,812 |
| 9 | Williamson, J. G. | 4,640 | 27 | Martin, J. W., M.B. .. .. | 3,812 |
| 10 | Bradford, H. .. | 4,630 | | | |
| 11 | Fawcett, W. J., M.B. .. .. | 4,482 | 28 | Robinson, R. H... | 3,683 |
| | | | 29 | Gabbett, P. R. D. | 3,677 |
| 12 | Joynt, H. W. .. | 4,475 | 30 | O'Connell, M.D... | 3,636 |
| 13 | Saunders, W. E... | 4,470 | 31 | Palmer, C. de M., M.B. .. .. | 3,566 |
| 14 | Leckie, D., M.B... | 4,342 | | | 3,558 |
| 15 | Charlton, W. J. .. | 4,310 | 32 | Ward, E. C. R. .. | |
| 16 | Ruxton, J., M.B. | 4,300 | 33 | Finlay, W. .. | 3,537 |
| 17 | Anthonisz, A. H., M.B. .. .. | 4,185 | 34 | Sullivan, W. P. .. | 3,513 |
| | | | 35 | Joynt, E. H., M.D. | 3,486 |
| 18 | Tobin, W. .. | 4,170 | 36 | Dickson, J. R. .. | 3,450 |

## LONDON EXAMINATION, FEBRUARY 1871.

*Candidates for Commissions in Her Majesty's Army and Naval Medical Services.*

### ANATOMY AND PHYSIOLOGY.

1. Give the dissection requisite to expose the internal maxillary artery and its branches in the whole of its course, mentioning the parts necessarily brought into view, or removed in so doing; then enumerate the branches in the order in which they arise, and describe their distribution.

2. Describe the minute structure and chemical composition of bone. State what bones are formed in membrane and not in cartilage, and to what extent the ossification of the long bones is also not intra-cartilaginous.

3. Describe the course observed in the ossification of the femur and of the tibia, stating the order and periods of life at which ossification commences and is completed at each point.

4. Describe the *os hyoides*, its muscular and other connections.

5. Mention the parts that would be divided by a cut down to the bone, extending vertically downwards from the outer canthus of the eye to the lower border of the mandible.

### SURGERY.

1. Describe the symptoms of congenital infantile syphilis, and the treatment for its relief.

2. By what external symptoms may a scirrhous tumor of the breast be distinguished? Under what circumstances would an operation for its removal be advisable? Describe the microscopical characters of scirrhus.

3. A man was wounded on the inside of the upper part of the thigh with a knife: the external wound soon healed; shortly afterwards an arterial thrill was observed in the large veins in the immediate neighbourhood of the wound. Describe what had taken place, and the treatment to be adopted in such a case.

4. Describe the symptoms of traumatic gangrene following compound fracture of the leg, and what treatment should be persued, local and constitutional.

5. Describe the symptoms of hæmatocele of the tunica vaginalis, and how it should be treated.

6. What would be the symptoms of ruptured brachial artery, the result of direct violence, without an external wound, and the treatment in such an injury.

### Medicine.

1. Mention the chief pathological conditions affecting the membranes of the brain and cord, and describe a case of tubercular meningitis.

2. What conditions of the heart are most usually connected with dropsy? Enumerate the various symptoms, and state how you would treat a case in which there were valvular lesions as well as weakened heart.

3. What are the causes, symptoms, and treatment of cirrhosis of the liver, and how far may a similar condition affect other organs?

4. What are the causes of ulceration in the alimentary tract? Give the treatment of a case of gastric ulcer with hæmorrhage.

5. What are the principal causes of difficult labour, and give the treatment for each cause.

6. What are the chief mineral alkalies employed in medicine? Notice the chief pharmacopœial preparations, and state briefly for what disease they are used.

### Natural History, &c.

*Voluntary Examination.*

### Zoology.

1. Describe the chief modifications of the structure of the heart in animals.

2. Give the characters of the class Crustacea, and those of its principal modifications.

3. What are the essential characters of the genus *Equus*? How many species are known in a wild state, and where are these found?

4. Describe the structure and development of the genus Tænia.

5. What if ment by Hybernation in animals?

### Botany.

6. Give the characters of the natural orders, Rubiaceæ and Umbelliferæ.

7. Describe the vegetative and reproductive organs of the genus Chara.

8. Define the terms *capsule, drupe, berry, achene. follicle, legume, seliqua,* and illustrate them by examples from the British Flora.

9. What are the principal modification of stipules? In what British orders are they generally present.

10. Give an account of the causes and course of the circulation of the sap in plants.

### Physics, &c.

11. Enumerate the planets which constitute the solar system, giving the distance of each from the sun, its size and the number of its satellites.

12. Explain the principal and construction of the thermometer; state how those of Fahrenheit, Centigrade, and Réaumur differ, and how the degrees of each may be converted into those of the others.

13. Give an account of the principal volcanic areas of the world.
14. What is coal? How is it supposed to have been formed? In what countries are the most important coalfields to be found?

### Languages.

#### I. French and German.

Conversational examinations in each, with exercises of dictation and translation.

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## NETLEY EXAMINATION, AUGUST 1871.

Held at the close of the 22nd Session.

### A. Written Examination.

#### I. Military Hygiene.

1. What is the usual length of marches; how much ground is got over per hour; what weight will the Infantry soldier carry on active service, and what are the chief conditions during marches which may affect his health?
2. What are the chief diseases arising in camps, and what precautions would you take to keep camps healthy? What should be the amount and kind of food on active service?
3. Give a general statement of the sickness and mortality of the soldier in India, and state, especially, what steps you would take in anticipation of, or during an attack of cholera.
4. Give a brief statement of the best known facts on the effect of a hot climate on natives of a temperate region.

#### II. Military Medicine.

1. Under what conditions are typhus and typhoid fever generated in camps? Give the symptoms of *typhus* under the following heads, and in the following order:—

(*a.*) Character of the chill.
(*b.*) When prostration appears.
(*c*). Describe the exanthem; when it usually appears; the one which it most resembles, and the diagnostic signs.
(*d.*) The head symptoms, and usual condition of mental faculties throughout the disease.
(*e.*) Chest symptoms.
(*f.*) Abdominal symptoms.
(*g.*) Urine.
(*h.*) Temperature from first, and as usually observed throughout the disease.
(*i.*) If case terminates favourably, when does the change usually appear, and in what manner?
(*k.*) Describe the anatomical lesions, contrasting them with those of typhoid fever.
(*l.*) The most common sequels of the disease.
(*m.*) Give a summary of the most rational treatment.

2. (1.) What is the probable source of danger from encamping on ground lately occupied by a body of men among whom cholera has prevailed.
(2.) What is the standing order to be observed when cholera appears in an epidemic form in barracks in India, and what is the object of this order?
(3.) What is the object of frequent inspections of men when cholera prevails?

(4.) Define exactly what you mean by the term "premonitory "diarrhœa" in cholera.

(5.) At what hour does cholera most usually attack?

(6.) What is the difference between the temperature of the surface, and that in the rectum, in the stage of collapse?

(7.) What is the period of suppression of urine in very severe cases?

(8.) What is the condition of the respiratory function during collapse, and what the prognostic value of very rapid respiration?

(9.) Describe the evacuations from the first setting in of the disease up to the time of convalescence.

(10.) What is the prognostic value of bloody evacuations in this disease?

(11.) In what condition are the lungs usually found after death, as regards blood, contents, and weight? How does Dr. George Johnson explain this condition? State any resonable objections that have been brought against the theory?

(12.) How should you treat premonitory diarrhœa.

(13.) What should be done with the evacuations of cholera patients?

(14.) What are the objections to the use of opium, when the disease is established?

(15.) If urine is long suppressed after reaction appears, what would you do to aid nature in restoring the secretion?

## III. Military Surgery.

Question 1: Give an account of pyæmia as a complication of gun-shot wounds in military hospitals, mentioning your reply.

(*a.*) The classes of wounds which appear to be most liable to the supervention of pyæmia, and the probable explanation of this special liability.

(*b.*) The train of symptoms by which it is usually ushered in, and accompanied to its termination.

(*c.*) The circumstances in campaigning which favour its development.

(*d.*) The means of prevention, and lastly,

(*e.*) The treatment.

Question 2: A patient comes before you who is hypermetropic and presbyopic.

(*a.*) Explain the nature of these visual conditions.

(*b.*) Describe the steps by which you ascertain the amount of hypermetropia and presbyopia of the patient.

(*c.*) Assume any degrees of hypermetropia and presbyopia you please, and then calculate the focal powers of the lenses that will correct them.

Question 3: Describe the treatment of gun-shot wounds of the head, dividing your reply under the treatment of:—

(*a.*) Contusions and wounds of the scalp.

(*b.*) The same, together with contusion or fracture of the cranium, but without depression of bone.

(*c.*) The same, but with depression of bone.

(*d.*) Wounds with penetration of the cranium.

## IV. Pathology.

Question 1: What is lardaceous disease? Describe the character of the lesion—anatomical and chemical. In what textures and organs, and in what parts of these organs is the lesion found? How is the lesion to be recognised after death, with and without the iodine test solution? Give the composition of the iodine test solution, and describe the conditions under which lardaceous disease is brought about.

Question 2: What do you understand by "hæmatoma"? In what form, and in what part of the body, has the lesion been shown to you? What is the nature, its usual site, and the circumstances under which it is developed?

Question 3: Serjeant Thomas Eyles, aged 33, after 13½ years' service, was admitted into Netley Hospital from India, after a voyage of 46 days. He had

served in India 5 years, and 2½ years in Malta. He is reported to have suffered from gonorrhœa 46 days, splenitis 32 days, bronchitis 30 days, orchitis 12 days, diarrhœa, rheumatism, and hepatitis. The duration of illness before admission was 234 days, and was diagnosed as "ulceration of the stomach."

The points of striking character in the history of the case are:—emaciation excessive; he could only lie on his back, inclined to the left side, relieved by sitting up in bed and leaning forward. Breath of very fetid odour. Respiration easy, 20 per minute, lancinating pain in right side on deep inspiration, intense bad taste in the mouth, appetite gone, frequent inclination to vomit, fixed pain immediately below ensiform cartilage, extending to the right side, over hepatic region, abdomen swollen and tympanitic, and exquisitely tender on pressure. Symptoms were believed to indicate the stomach as the seat of disease; others pointed to the liver, and the detailed medical history sheet referred to attacks of dysentery at Nusserabad.

Describe the morbid conditions of the *liver*, including its dimensions, and the relation of the lesions to the stomach, and also to the state of the *intestines*, the conditions of which are required to be described.

## B. Practical Examination.

### Pathology.

(*Three hours allowed.*)

1. Examine the portions of tissue placed in the dishes. State of what organ each is a part, and describe its morbid condition.
2. In the preparations numbered 1, 2, 3, 4, 5, and 6, define anatomically what parts are shown, and describe the lesion or lesions which are illustrated in each.
3. Determine the magnifying power of any one of the microscopes, and append the scale used.
4. Describe and name generally, what you see in the fluid contained in the test tubes, examined under the highest power.
5. Name each of the preparations placed under the microscopes on the table.

### Military Hygiene.

(*Three hours allowed.*)

1. Examine the sample of water before you,—as much as can be done in the time.
2. Examine the contents of the packet before you, chemically and microscopically.
3. Read the meteorological instruments before you, and apply the necessary corrections.

### Military Medicine and Surgery.

#### 1. Medicine.

(*Twenty minutes for examination.*)

Examine the case of—

Write concisely a history of the case,—your diagnosis, prognosis, the probable effects of treatment, and the influence of the disease (or injury) on the man's fitness to service as a soldier.

(*Thirty minutes allowed for this description.*)

#### 2. Surgery.

(*One hour allowed.*)

Examine preparation No. , as far as you can without handling it.

State what it is; the nature of the injury the bone has sustained, the probable symptoms which followed the injury, and the treatment you would adopt if a similar injury occurred in a case under your care.

## EXAMINATION OF ASSISTANT SURGEONS FOR PROMOTION.

*(Questions sent to Stations.)*

January 1871.

### [MILITARY MEDICINE.

1. Give a definition of *pyæmia*, the morbid anatomy of this affection, its symptoms and treatment.
2. Describe the etiology, symptoms, pathology, morbid anatomy, and treatment of sun-stroke. (N.B.—It is requested that this question be answered in relation to military experience more particularly.)
3. Describe diphtheria, its etiology, symptoms, diagnosis and treatment.

### MILITARY SURGERY AND SURGICAL ANATOMY.

1. Erysipelatous inflammation :—
   (A.) Describe, (*a*) its character, and (*b*) its causes.
   (B.) Describe the distinguishing features of (*a*) cutaneous, (*b*) cellulo-cutaneous, and (*c*) cellular, erysipelas.
   (C.) Discuss the treatment of erysipelas under, (*a*) preventive measures, and (*b*) curative treatment.
2. Name the distinguishing signs of the three following affections of the testicle, (1) syphilitic, (2) tubercular, (3) cancerous, under the following heads :—

| | | | |
|---|---|---|---|
| (*a.*) Age— | (1) syphilitic, | (2) tubercular, | (3) cancerous. |
| (*b.*) History, | do. | do. | do. |
| (*c.*) General health, | do. | do. | do. |
| (*d.*) Progress, | do. | do. | do. |
| (*e.*) Pain, | do. | do. | do. |
| (*f.*) Surface, | do. | do. | do. |
| (*g.*) Consistence, | do. | do. | do. |
| (*h.*) Testicle affected (one or both), | | | do. |
| (*i.*) Epididymis, | do. | do. | do. |
| (*k.*) Glands, | do. | do. | do. |
| (*l.*) Termination, | do. | do. | do. |
| (*m.*) Weight, | do. | do. | do. |
| (*n.*) Veins of Scrotum, | | do. | do. |
| (*o.*) Fluid in Tunica Vaginalis, | | do. | do. |
| (*p.*) Curability by treatment, | | do. | do. |

3. What articles are carried in the field panniers supplied to Medical Officers in charge of troops proceeding on active service ?
4. Elbow joint :—
   (*a.*) Describe the operation of excising the elbow-joint by the ordinary method.
   (MEMO.—Each step of the operation must be distinctly described. The several structures divided are to be named.)
   (*b.*) What muscles and other structures divided by the ordinary method are left undivided when the same operation is performed subperiosteally ?
   (*c.*) Name the anatomical structures, not cut in excision of the joint, which would be divided if amputation were performed a hand's breadth above the joint.

### Military Hygiene.

1. A camp being supplied with water from a single source, either a spring or small stream; what rules should be laid down with respect to the distribution of the water for men and animals, and for preventing any contamination? If necessary to filter it, how can it be best done with such common appliances as are available in camps?

2. What are the chief points to be attended to in the inspection of tents?

3. What are the chief causes of flour becoming sour, and how would you remedy it, supposing that the flour must be used for bread?

### Pathology.

1. When, on the removal of the calvarium and the *dura mater*, the convolutions of the cerebrum are seen to be flattened, what are the morbid conditions within the cranium which may give rise to this morbid condition?

2. Describe the *post mortem* appearances in cases of extreme scorbutus.

3. Describe the condition of the minute structure of the liver in extreme cirrhosis.

## APPENDIX No. XIX

## THE TRAINING OF HOSPITAL ATTENDANTS AT THE ROYAL VICTORIA HOSPITAL, NETLEY.

NOTE.—These duties are at present superintended by Staff Surgeon W. M. Webb, Registrar; Staff Assistant-Surgeon Moffitt, Instructor Army Hospital Corps; and Mr. J. Andrews, Apothecary to the Forces.

THE hospital attendants who present themselves at Netley for training, come from various sources: 1st, there are the non-commissioned officers and men, already in the Army Hospital Corps, who entered before a regular system of training had been established; 2nd, there are volunteers from regiments to recruit the corps who are called Probationers; 3rd, there are non-commissioned officers from regiments who are qualifying for Regimental Hospital Serjeants; 4th, there are privates from regiments to be trained for Regimental Hospital Orderlies; and now to these may be added female probationers qualifying for Hospital Nurses.

The course of training consists of two parts. One may be called the *practical* part and the other the *theoretical* part. The former is carried on in the medical and surgical divisions of the hospital by actual attendance on the sick, and the latter in the Army Hospital Corps lecture room by lecture, and by exercise in those parts which will admit of such.

The theoretical instruction is given on five days a week between the hours of 2 and 4 P.M., and extends over a period of five weeks with each class. Weekly examinations are held during the course. Each class numbers generally between 20 and 30 attendants; but a greater number could be taken if necessary.

The instruction given is based on the "Regulations for Hospital Servants." The subjects are arranged under the following headings:—

### SUBJECT I.

*General Anatomy of the human body.*

The bones of the body.
The heart, blood-vessels, and circulation.
The internal organs, their uses, their positions, and outline externally.

### SUBJECT II.

*The making and application of the various kinds of bandages.*

General remarks, and instructions regarding the making and applying of bandages.
Bandages for the head and face.
Bandages for the chest and upper part of body.
Bandages for the lower part of body.
Bandages for the upper extremity.
Bandages for the lower extremity.
Bandages common to different parts, such as the starch bandage, the many tailed bandage, and the stump bandage.
Triangular bandage.

### SUBJECT III.

*Fractures of the different bones of the body.*

Nature of fractures, and evil results from neglect or rough handling.
How to prepare pads, splints, and other apparatus required for putting up fractures.
The apparatus to be got in readiness for the medical officer to put up each kind of fracture.

SUBJECT IV.

*The dressing of sores, wounds, and injuries.*

Apparatus and materials necessary for dressing purposes.
How to wash a sore or wound.
How to apply dry dressing, antiseptic dressing, water dressing, evaporating dressing, ointment dressing, and irrigation.
How to make and apply linseed meal poultice, bread poultice, and charcoal poultice.
How to strap a limb or other part of the body.

SUBJECT V.

*The administration of medicines, and the application of external remedies.*

General directions.
The doses and the hours of repeating.
How to administer mixtures, pills, draughts, powders, a bolus, electuary, an enema, a suppositary, and an injection.
How to apply a lotion, a liniment, a gargle, a collyrium, ointments, caustics, a sinapism, a mustard poultice, a blister, a hot water fomentation, a turpentine fomentation, hot water jar, ice bags, and leeches.
How to give a hot bath, a warm, tepid, or cold bath, a hip bath, a foot bath, a compound sulphur bath, an alkaline bath, an acid bath, a mustard bath, a water-vapour bath, a mercurial-vapour bath.
How to give hot water inhalation, hydrocyanic acid inhalation, and turpentine inhalation.

SUBJECT VI.

*The management of hospital wards; the nursing of helpless patients; and the observation of the sick.*

The arrangement of ward equipment.
The cleaning of floors, windows, &c., and emptying of slops.
The ventilation of wards.
Preparing beds for patients; the ordinary bed, the air-bed, and the water-bed.
Lifting and laying helpless patients according to the nature of their disabilities.
Observation of the sick as regards general appearance, intelligence, sleep, pain, state of skin (the use of thermometer in taking temperature), the tongue, the pulse, the respiration, cough, expectoration, urine, state of bowels, state of wounds, and appetite and thirst.

SUBJECT VII.

*The immediate treatment of the apparently drowned, and of men when seized with fits.*

How to restore the apparently drowned.
How to manage a patient in an epileptic fit, in an apoplectic fit, in a state of drunkenness, and when suffering from sun-stroke.

SUBJECT VIII.

*The cooking of diets, and the preparation of drinks.*

SUBJECT IX.

*The names and uses of surgical instruments and appliances.*

The capital case of instruments.
The pocket case.
The *post mortem* case.
The stomach pump.
The enema apparatus.
Sundry miscellaneous instruments.

SUBJECT X.

*The first assistance to be rendered to wounded on the field of battl*

How to expose the wound.
How to arrest bleeding.
The application of the first dressing.
The application of field splints to fractured limbs.
The administration of drinks and stimulants.
How best to lift and lay in a position suited to the nature of the wound.

SUBJECT XI.

*The transport of sick and wounded on stretchers carried by bearers, or placed upon wheeled supports.*

Description of field stretcher and wheeled support.
Bearers, with their respective duties.
The words of command used in conducting the transport.
How to place a patient on a stretcher.
How to carry the stretcher with the greatest ease and comfort to the patient.

SUBJECT XII.

*The removal of sick and wounded by various improvised methods where no regular conveyances are available.*

By one bearer.
By two bearers forming a two-handed seat, a three-handed seat, or a four-handed seat.
How to form a stretcher with a blanket and rifles.

SUBJECT XIII.

*The transport of sick and wounded by cacolets or mule chairs.*

Description of cacolets and pack saddle.
How to load and unload the cacolets.

SUBJECT XIV.

*The transport of sick and wounded by litters.*

Description of litters.
How to load and unload litters.

SUBJECT XV.

*The transport of sick and wounded by means of the ambulance carriage.*

Description of the ambulance carriage and its equipment.
Loading and unloading the ambulance carriage.

SUBJECT XVI.

*The transport of sick and wounded by railway.*

By invalid carriages specially constructed for the purpose.
By passenger carriages.
By luggage vans.

SUBJECT XVII.

*The Field Hospital equipment.*

How to pack and unpack the medical store cart and its contents.
How to pitch and strike the hospital marquee.
How to carry the medical panniers, field companion, and medical valise.

The probationers for the Army Hospital Corps are three months under training in the manner and in the subjects above described. At the end of that period, before transfer to the corps, they are orally examined by a board, composed of the two Medical Officers in charge of the Medical and Surgical Divisions, where they have done duty, and the Instructor of the Corps. In addition they are reported on by the Medical Officer in charge of the division where they have served as to their behaviour towards the patients, and performance of ward duty; also by the Captain of Orderlies as to their general conduct, and by the Schoolmaster as to their education.

A similar report is furnished on each probationer for Regimental Hospital Orderly.

## Subject XVIII.

*Compounder of Medicines, and Medical Storeman.*

Special training and instruction, for a period of not less than six months, in:—

Familiarity with the Latin names and words, as well as of the printed labels used in a dispensary.

*Pharmacy.*—A knowledge of the various articles of Materia Medica, and preparations in the British Pharmacopœia.

*Drugs and pharmaceutical remedies.*—Appearances, taste, odour.

*Medicines containing active ingredients.*—Their composition, and exact quantities of the important ingredients.

*Poisons.*—Names, characters, dangerous doses; antidotes and remedial measures to be adopted in cases of overdose.

*Infusions and decoctions.*—Preparation and preservation.

*Fomentations.*—Preparation and application.

*Extracts and salves.*—Preservation and characters, when altered by age, climate, or neglect.

*Tinctures and liniments.*—Strengths, preparation, and composition.

*Lotions and washes.*—Preparation and mode of application.

*Prescriptions.*—Reading, making up, labelling, and mode of administration of the remedies ordered.

*Chemical cabinet.*—Contents, uses, and preservations.

*Returns.*—The careful preparation of requisitions and half-yearly returns of medicines and appliances under the instructions of the Medical Officer.

At the expiration of the training, the man is reported upon by the Medical Officer or Apothecary, by whom he has been undergoing instruction, as to his fitness to undergo examination. If this report be favourable, a board of examiners is assembled. The examination is conducted partly in writing, and partly in practical knowledge, being tested by having to identify drugs without labels, and in actual dispensing in the presence of the board.

## Subject XIX.

*Clerks to Registrars, and to Principal Medical Officers.*

1. Men selected for training must have shewn themselves to be efficient as copyists and general clerks; they must have undergone or be prepared to undergo the examination for promotion.

2. The instruction comprises:—

*a.* Reading and copying from dictation extracts from some medical or surgical work, so chosen as to render the man familiar with professional words and technical terms.

*b.* Writing routine official letters from drafts and instructions.

*c.* Arithmetic, including decimals and the use of logarithms.

*d.* Classification and nomenclature of diseases.

*e.* Preparing returns, and mode of keeping admission and discharge books, preserving medical history sheets, and keeping various hospital records.

*f.* Copying proceedings of Medical Boards.

*g.* Use of meteorological instruments, taking of meteorological observations, and compilation or correction of meteorological returns.

3. The compilation of a complete series of returns such as morning states, weekly and annual returns from data to be given for the purpose. The compilation of returns should form an important part of the instruction to be given as well as of the examination.

## Subject XX.

*Training of non-commissioned officers and orderlies as attendants on insane officers and soldiers.*

1. Suitable men are selected as probationers.

2. Probationers are carefully and fully instructed in the regulations laid down for the performance of the duties of the various grades of attendants employed in the care of lunatics.

3. They are them employed in insane wards for a sufficient time under th supervision of an experienced attendant, who completes their training unde the orders of the Medical Officer in charge.

## APPENDIX No. XX.

## CIRCULARS, GENERAL ORDERS, &c.,

[HAVING REFERENCE TO THE MEDICAL DEPARTMENT, FROM 1ST MARCH, 1871, TO 1ST MARCH, 1872.

### 1st.—WAR OFFICE CIRCULARS.

Extract from Regulations for Married Soldiers.

VII. *Medical Attendance and Medicine.*

Clause 53. 1st April, 1871.

57. The families* of soldiers on the Married Roll are entitled to medical attendance and medicine,—

(*a*) Wherever there is a Military Medical Officer, or a civil practitioner employed under contract, provided the families reside within one mile from either the Staff Dispensary, the Military Hospital, or such other point at the station as may be fixed by the Secretary of State for War.

Midwifery. (*b*) In midwifery cases they are not entitled to attendance, except in cases where it can be shown that no midwife or private practitioner could possibly be called in; but in the event of the midwife requiring assistance in any case of danger, it will be the duty of the Military Medical Officer, provided there be one at the station, to render the necessary aid.

Medical Comforts. (*c*) The following are the only articles which may be issued as medical comforts to the families of soldiers on the Married Roll, and only at stations where there is a Hospital Provision Store, viz.:—Port wine or sherry, brandy, arrowroot, and essence of beef, or *extractum carnis*.

58. Medical comforts purchased under the authority of Commanding or Medical Officers cannot be sanctioned as a public charge.

59. Each case receiving medical comforts must invariably be entered by the Medical Officer in the Medical Case Book. Such medical comforts will be demanded daily from the hospital stores on W. O. Form 1198.

VIII. *Hospitals for Women and Children.*

Hospitals. 60. At certain stations, hospitals for women and children, containing a limited number of beds, have been provided under Treasury sanction.

Admission. 61. The families of non-commissioned officers and men married with leave, and on the Married Roll of a regiment, and provided with quarters may, in such cases as are specified below, be admitted into these hospitals, and receive treatment at the public expense, when there is available accommodation. Male children above the age of ten (unless in very special cases) must not be admitted into hospitals for women and children.

Diets. Extras. 62. So long as women and children are under medical treatment in hospital, they will receive at the public expense (in addition to medical attendance and medicine) such hospital diets and extras as prescribed by War Office Circular 849, of 30th January, 1864.

Infectious Diseases. 63. Cases of scarlet fever and small-pox, when occuring in barracks or huts, will always be admitted into these hospitals, with a view of preventing, or limiting, the spread of such diseases. All other infectious maladies will, as a rule, be treated in quarters, and cases will only be admitted into the hospitals

* The term Family when used in these regulations will be understood to include the wife of the soldier and his legitimate children and step-children under fourteen years of age. (Para. 28 of same Circular.)

on the order of the Principal Medical Officer, under circumstances which in his opinion justify a departure from the general rule.

64. Infectious cases will never be treated in hospital under the same roof with lying-in women.

General Diseases.

65. Cases of serious and acute disease are only admissible, when in the opinion of the Principal Medical Officer, the nature, or the circumstances, of the cases are such as to justify their treatment in hospital, at the public expense. Cases of chronic disease are not admissible without the sanction of the Director-General of the Army Medical Department.

Parturient Cases.

66. The wives of non-commissioned officers and men, when occupying wooden huts, will be entitled to admission to hospital for their confinements. When in quarters or barracks they will also be entitled to admission, except—

(*a*) When occupying two rooms;
(*b*) When occupying one room and without children.

General Regulations.

67. The wives and children of soldiers coming to hospital for admission will be required to bring a certificate, signed by the Commanding Officer, that the applicant is the wife or child of a soldier on the Married Roll of a regiment, and entitled to quarters in barracks. These admission tickets will be forwarded to the War Office with the abstract of hospital stoppages and diets issued.

Certificate.

Exceptional Cases.

68. Cases of those who are not the wives or children of soldiers on the Married Roll of corps are only admissible (upon payment of a daily stoppage of 1*s.* for each adult and 6*d.* for each child) under exceptional circumstances, or when their removal from the public quarters occupied by them may be deemed necessary, as a matter of safety and protection in guarding the troops and their families against the spread of contagious disease.

Returns.

69. The Principal Medical Officer will, in future, at the end of every month, forward to the Director-General of the Army Medical Department, a Return (on W. O. Form 1020) of the patients treated in the women's hospital, affording at the same time, in the column of remarks, any explanation that may be necessary, especially as regards the admission of cases of general disease. This Return is in lieu of that hitherto furnished monthly (on W. O. Form 26) to the Quartermaster-General, in accordance with paragraph 1484 of the Queen's Regulations.

Number of Beds.

70. The number of beds allowed by Treasury grant must never be exceeded, unless with the authority of the Secretary of State for War.

Wards.

71. At the stations where hospitals for women and children have not been established, there will be no objection to the allotment of a room in barracks, if available, as a ward for the reception of such cases of sick women and children belonging to families on the Married Roll as it may be deemed expedient to remove from their quarters. Equipment and fuel and light will be provided for any such ward; but it is to be distinctly understood that under no circumstances will any expense for diet or nursing be admitted as a charge against the public.

## Infected Bedding, Clothing, &c.

Clause 74.

Whenever hospital bedding, clothing, &c., have been used by patients affected with specific fevers of infectious character they will be treated as follows:—

1. The hair of the mattress, &c., will be opened out, exposed to the air, and beaten, and, when practicable, submitted to a dry heat of not less then 250° for at least an hour before being used again; the remainder of the bedding, the hospital clothing, and such of the clothing worn by the patients at their admission as is not liable to injury thereby, will be disinfected, steeped in boiling water, exposed to the air, beaten, and afterwards washed with soap and water. Boiling the articles instead of steeping them in boiling water is preferable when it can be done, in which case disinfection with chemicals will not be necessary.

2. Such articles of a soldier's kit as cannot be treated in the manner laid

down in the foregoing paragraph, will be removed to hospital and there fumigated, and exposed to air and sun for a week, beaten and brushed.

3. Of the barrack bedding in use by suffers from infectious fevers, prior to admission into hospital, the straw will be burnt, and the remainder, together with the clothing, not actually in use by them, will, if not liable to injury by the process, be immediately steeped in boiling water, exposed to the air, and washed, without removal to hospital.

4. Whenever, in consequence of the occurrence of disease in barracks, it is considered advisable by the Principal Medical Officer of the district, the barrack room will be vacated, thoroughly cleaned, and lime washed, and left unoccupied with the windows open as long as practicable; but when, in addition, it is deemed necessary in the first instance to fumigate the room, one of the following processes will be adopted :—

*With Chlorine Gas.*

| | |
|---|---|
| Take common salt .... .... .... .... | 4 oz. |
| Oxide of manganese (in powder).... .... | 1 „ |
| Sulphuric acid .... .... .... .... | 1 „ |
| Water .... .... .... .... .... | 2 „ |

The water and acid to be mixed together, and then poured over the ingredients in a delf basin, which should be placed in a pipkin of hot sand.

*With Nitrous Acid Gas.*

| | |
|---|---|
| Take copper shavings .... .... .... .... | ½ oz. |
| Nitric acid .... .... .... .... .... | 1½ „ |
| Water .... .... .... .... .... | 1½ „ |

Pour the acid and water upon the copper in a small jar.

*With Sulphurous Acid Gas.*

Burn two ounces of sulphur in a pipkin.

5. All doors and windows and other openings in the room will be closed before commencing fumigation.

6. The operator should leave the room immediately the process has begun.

7. At the expiration of from two or three hours all doors and windows will be thrown open, and free ventilation established.

8. Barrack rooms will be entirely emptied before being fumigated.

9. The lime washing will be done by the Royal Engineers, and the cleansing and fumigation by the Control Department. Medical Officers will supervise the use of chemicals when it is necessary to employ them.

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Book Chests for Regimental Surgeons.

Clause 84. 1st May, 1871.

In future book-chests for Regimental Surgeons will be accounted for in the Regimental Equipment Ledgers furnished by Officers Commanding, instead of in the Medical Accounts.

Quarters, Fuel, and Light.

Clause 87.

1. The Secretary of State for War has approved of the annexed schedule regulating the extent of accommodation to be allotted to officers in public quarters, both at home and abroad, the number of rooms for which issues of fuel and light are provided for home service, and the commuted allowance in lieu thereof.

2. Although the accompanying scale will be adhered to as a rule, officers will be subject to circumstances arising out of the exigencies of the public service, whereby it may become necessary for them to occupy quarters of less extent, and draw consequently smaller allowances, than those provided for in the scale.

3. The number of rations of fuel and light to be issued at home stations is laid down in Clause 20, Army Circulars 1871.

SCHEDULE.

| Relative Army Rank. | Staff, Departmental, or Educational Appointment. | No. of Rooms to be allotted. | | No. of Rooms for which Fuel and Light are provided. | Commuted Allowance in lieu of Fuel and Light. | |
|---|---|---|---|---|---|---|
| | | Personal. | Servants, &c.* | | Winter, per diem. | Summer, per diem. |
| | | | | | s. d. | s. d. |
| As Major-Gen. | Inspector-General, Musketry ... ... ... | | | | | |
| | Controller ... ... ... ... ... ... | 7 | 2 | 6 | 3 0 | 2 0 |
| | Inspector-General, Hospitals, after 3 years ... | | | | | |
| | Deputy Adjutant-General, Dublin ... ... | | | | | |
| „ Brigr.-Gen. | Deputy Quartermaster-General, Dublin ... ... | 6 | 2 | 5 | 2 6 | 1 9 |
| | Inspector-Gen., Hospitals, under 3 years' service | | | | | |
| | Deputy Adjutant-General, not at Head-Quarters or Dublin ... ... ... ... ... ... | | | | | |
| | Deputy Quartermaster-General, not at Head-Quarters or Dublin ... ... ... ... ... | | | | | |
| | Deputy Controller ... ... ... ... ... | | | | | |
| „ Colonel ... | Dep. Inspector-Gen., Hospitals, aften 5 years ... | 5 | 1 | 4 | 2 0 | 1 6 |
| | Chaplain, 1st Class ... ... ... ... ... | | | | | |
| | Commandant and Chief Instructor, School of Musketry ... ... ... ... ... ... | | | | | |
| | Commandant and Superintendent, School of Gunnery ... ... ... ... ... ... | | | | | |
| | Assistant Adjutant-General not at Head-Quarters | | | | | |
| | Assistant Quartermaster-Gen. not at Head Qrs. | | | | | |
| | Military Secretary to a General Officer ... ... | | | | | |
| | Chief Instructor of Musketry ... ... ... | | | | | |
| | Assistant Controller... ... ... ... ... | | | | | |
| | Dep. Inspector-Gen., Hospitals, under 5 years ... | | | | | |
| „ Lieut.-Col | Chaplain 2nd Class ... ... ... ... ... | 5 | 1 | 4 | 2 0 | 1 6 |
| | Chief Instructor, School of Gunnery ... ... | | | | | |
| | Director of Gymnastics ... ... ... ... | | | | | |
| | Surgeon-Major ... ... ... ... ... | | | | | |
| | Assist. Military Secretary, if a substantive Field Officer, where there is no Military Secretary... | | | | | |
| | Superintendent of Garrison Instructors ... ... | | | | | |
| | Commissary ... ... ... ... ... ... | | | | | |
| | Assistant Director of Gymnastics... ... ... | | | | | |
| | Chaplain, Third Class ... ... ... ... | | | | | |
| | Dep. Judge Advocate, if commissioned as such... | | | | | |
| | Governor, Military Prison, 1st Class ... ... | | | | | |
| | Surgeon not attached to a Regiment ... ... | | | | | |
| „ Major ... | Staff Veterinary Surgeon ... ... ... ... | 4 | 1 | 3 | 1 6 | |
| | Assistant Military Secretary, if a Captain, where there is no Military Secretary ... ... | | | | | |
| | Gunnery Instructor ... ... ... ... ... | | | | | |
| | Capt. Assistant Superintendent of Experiments... | | | | | |
| | Acting Assistant Controller ... ... ... | | | | | |
| | Control Paymaster ... ... ... ... ... | | | | | |
| | Dep.-Assistant Adjutant-Gen. not at Head-Qrs.... | | | | | |
| | Dep.-Assist. Quartermr.-Gen. not at Head-Qrs.... | | | | | |
| | Assist. Military Sec., where there is a Mil. Sec. ... | | | | | |
| | Major of Brigade ... ... ... ... ... | | | | | |
| | Brigade Major, School of Gunnery ... ... | | | | | |
| | Garrison Instructor ... ... ... ... ... | | | | | |
| | Captain Instructor, School of Musketry ... ... | | | | | |
| | Aide-de-Camp... ... ... ... ... ... | | | | | |
| | Chaplain, 4th Class ... ... ... ... ... | | | | | |
| | Deputy Commissary... ... ... ... ... | | | | | |
| „ Captain ... | Deputy Control Paymaster... ... ... ... | 3 | 1 | 3 | 1 6 | 1 0 |
| | Assistant Surgeon, 6 years' service, not attached to a Regiment ... ... ... ... ... | | | | | |
| | Veterinary Surgeon, 1st Class, not attached to a Regiment ... ... ... ... ... ... | | | | | |
| | Staff Officer of Pensioners, if above Lieutenant | | | | | |
| | Provost Marshal, if so commissioned ... ... | | | | | |
| | Town or Fort Major ... ... ... ... ... | | | | | |
| | Governor, Military Prison, 2nd and 3rd Class ... | | | | | |
| | District Instructor of Musketry ... ... ... | | | | | |
| | Apothecary, after 15 years ... ... ... ... | | | | | |
| | Clerk of Works, 1st Class ... ... ... ... | | | | | |

* Mounted Officers of the General or Departmental Staff are allowed a room for their grooms in addition to the number stated in this column.

Schedule—*continued.*

| Relative Army Rank. | Staff, Departmental, or Educational Appointment. | No of Rooms to be allotted. | | No. of Rooms for which Fuel and Light are provided. | Commuted Allowance in lieu of Fuel and Light. | |
|---|---|---|---|---|---|---|
| | | Personal. | Servants, &c. | | Winter, per diem. | Summer, per diem. |
| As Lieuts. | Assistant Commissary ... ... ... ...<br>Assistant Control Paymaster ... ... ...<br>Assistant Surgeon, under 6 years, not attached to a Regiment ... ... ... ...<br>Clerk of Works, 2nd Class ... ... ... ...<br>Clerk, Royal Engineer Dept., 1st and 2nd Class...<br>Apothecary, under 15 years ... ... ...<br>Deputy Provost-Marshal, if so commissioned ...<br>Town or Fort Adjutant ... ... ...<br>Garrison Quartermaster ... ... ...<br>Lieut. Assist. Instructor, School of Musketry ...<br>Veterinary Surgeon, not attached to a Regiment<br>Staff Officer of Pensioners, if below the rank of Captain ... ... ... ... ... | 2 | 1 | 2 | 1 0 | 1 0 |
| ,, Ensigns. | Clerk of Works, 3rd Class ... ... ... ...<br>Clerk, Royal Engineer Department, 3rd Class ...<br>Superintending Schoolmaster ... ... ...<br>Acting Veterinary Surgeon ... ... ... | 2 | 1 | 2 | 1 0 | 1 0 |
| | REGIMENTAL.* | | | | | |
| | Field Officer, Commanding a Regiment or Battalion; or in independent command of two or more Batteries, &c., Royal Artillery† ... ... ... ... ... ... ... ... ... | 4 | 2 | 3 | 1 6 | 1 0 |
| | Other Field Officers ... ... ... ... ... ... ... ... | 2 | 1 | 2 | 1 0 | 1 0 |
| | Surgeon-Major, and Surgeon ... ... ... ... ... ... ... ... | | | | | |
| | Paymaster, after 15 years' full-pay service as Commissioned Officer with not less than 10 as Paymaster ... ... ... ... ... | | | | | |
| | Captain ... ... ... ... ... ... ... ... ... | 1 | ½ | 1 | 0 6 | 0 6 |
| | Assistant Surgeon, after 6 years' full-pay service ... ... ... | | | | | |
| | Paymaster, not holding honorary rank of Major ... ... ... | | | | | |
| | Instructor of Musketry, and Regimental Instructor ... ... ... | | | | | |
| | Subaltern ... ... ... ... ... ... ... ... ... | 1 | ½ | 1 | 0 6 | 0 6 |
| | Adjutant ... ... ... ... ... ... ... ... ... | 1 | ½ | | | |
| | Quartermaster ... ... ... ... ... ... ... ... | 2 | 1‡ | | | |
| | Assistant Surgeon, under 6 years' service ... ... ... ... | 1 | ½ | | | |
| | Veterinary Surgeon ... ... ... ... ... ... ... ... | | | | | |
| | Riding Master ... ... ... ... ... ... ... ... | | | | | |

* Separately shown for convenience.

† *i. e.* Colonels in command, Lieut.-Colonels on pay of that rank, and Lieut.-Colonels on Major's pay, or independent command of two or more batteries.

‡ When possible, or whenever the Officer is provided with special quarters of this extent by the authority of the Secretary of State for War.

## Pay &c., of Medical Officers, not attached to Regiments.

Clause 98. 1st Jnly, 1871.

1. The pay and allowances of Medical Officers not attached to regiments, will be issued, like that of all Staff Officers, by the Control Paymasters of the district in which they are serving, and not through any other channel.

2. At Home, Staff Medical Officers who are not attached to any district, will draw their pay and allowances from the Control Paymaster in London.

3. Clause 22, Army Circulars 1871, is hereby cancelled.

## Medical History Sheets of Men Transfered to Army Reserve.

Clause 144.

Medical History Sheets of all soldiers, who pass from the Army into the Army Reserve, will be forwarded to the Director-General of the Army Medical Department in the usual way by the Medical Officer in charge, care being

taken that they are correctly filled up before transmission, and that the date of transfer to the Reserve force is invariably entered in each sheet.

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Lactometers.

Clause 153. 1st September, 1871.

1. The supply lactometers to each regiment will be discontinued.

2. A set of instruments for testing milk—consisting of lactometer, thermometer, and cream test, in case—with the necessary instructions for their use will, in future, be supplied for service in those barracks and hospitals where the use of such instruments is considered necessary.

3. Demands for testing instruments will be made on the Controller, Royal Arsenal, in the manner directed for barrack stores.

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Meteorological Observations.

Clause 29. 1st February, 1872.

1. The Senior Medical Officer at any station where there are meteorological instruments, will either make the requisite observations himself, or see that they are carried out by some competent person whom he may select for that purpose, and in accordance with the following instructions.

2. As it is of great importance to preserve unimpaired the continuity of meteorological observations, all changes in the adjustment of instruments, in their position, mode of reading, or registering, will as far as possible be carefully avoided.

3. The observations will as far as possible be made by one person; where this is not practicable the deputy to whom they are confided will previously assure himself that his method of reading is identical with that of the principal observer, and both should satisfy themselves, by mutually testing the accuracy of their reading.

4. Registers (W. O. Form 848) should be as perfect as possible, but if, from any cause, observations be lost, no attempt should be made to fill the blank so caused.

5. The observations will be made at stated and regular times.

6. Before taking the means of the numbers in each month, the observer will look down each column in the register, to see that no evident error of entry has been made (an inch for instance in the reading of the barometer is a common error). He will examine the thermometric readings, to see that the maximum and minimum readings have not been interchanged; and, before dividing the sums of the numbers, he will count, in each column, the days on which observations have been entered, so as to exclude error in the division. Decimal arithmetic will be used throughout.

7. With the exception of the "attached thermometer" all thermometers must be read to the tenths of a degree.

8. The readings of the self-registering maximum thermometers at 9 A.M. must be entered in the register (cols. 19 and 23) as the temperature of the preceding day; for instance, the readings of the self-registering maximum thermometers at 9 A.M. on the 1st of the month must be registered as the temperature of the last day of the previous month; the readings on the morning of the 2nd as that of the 1st, and so on. This rule is not applicable to any of the other thermometers.

9. The registers containing the readings of the past month should be forwarded to the Director-General of the Army Medical Department during the first week in every month.

Admission and Discharge Books.

Clause 30.

1. Instead of Admission and Discharge Books being forwarded to the Army Medical Department at the end of each year, these books will in future be used *continuously* until they are filled up, and will be retained at the Head-Quarters of the Corps to which they refer until five years have elapsed from the date of admission of the last case which is entered; they will then be forwarded to the Principal Medical Officer of the station for disposal, in accordance with the instructions in Army Circulars, Clause 62, 1870.

2. After the last case admitted in each year, a blank page will be left in book, marked "end of the year 18—." The first case in each year must commence with No. 1. In the new issue of these books, the column for the number of cases will be blank, and the numbers will have to be inserted in ink.

3. The books for 1871 will be retained in accordance with these instructions.

## 2nd.—GENERAL ORDERS.

### Discharges.

G. O. 23. 1st March, 1871.

Referring to Article 1,126, of the Royal Warrant of 27th December, 1870 (Revised Army Regulations, vol 1), and to paragraph 1,416 of the "Queen's "Regulations and Orders for the Army," it is to be understood that in every case where a soldier is prevented by disability from re-engaging, the medical report on the 3rd page of the proceedings of the discharge board is to be countersigned by the Principal Medical Officer of the district or station in which such soldier is serving.

### Courts-Martial.

G. O. 44. 1st June, 1871.

With reference to paragraph 753 of the Queen's Regulations, the last paragraph of the medical certificate therein described—as to whether a prisoner is or is not marked with the letters B. C., or D.—will be omitted in future.

### Musketry.—Attendance of Medical Officers at Rifle Practice.

G. O. 15. 1st February, 1872.

1. With reference to the circular memoraudum of the 18th March, 1861 (General No. 119), it is again notified to general and other officers commanding at home and abroad that the attendance of Medical Officers at target practice under ordinary circumstances is unnecessary, and their presence at rifle ranges is, for the future, to be dispensed with, except at the following stations, viz.:—

At home { Aldershot, Shorncliffe, Dover, Portsmouth, Plymouth, Milton for Gravesend, Dublin, and the Curragh.

Abroad.—Gibraltar and Malta.

2. Where the hospital or quarters of Medical Officers so attending at these stations are within a mile from the ranges, the Medical Officer on duty, after reporting himself to the officer in charge of the firing party, may return to the hospital or quarters, but he will remain there whilst practice is going on and be in readiness for any emergency.

3. Should exceptional circumstances arise at any station which would appear to render expedient the presence of a Medical Officer on a rifle range other those specified above, the general or other officer commanding may, after consulting with the Principal Medical Officer, direct the attendance of a Medical Offieer when necessary.

4. The Principal Medical Officer is to report all cases of this nature for the information of the Director-General of the Army Medical Department, in order that timely provision may be made for the performance of the duties of the Medical Officer so employed.

5. As those stations where the attendance of Medical Officers at rifle practice is by the first paragraph hereof dispensed with, the name and address of a Medical Officer to whom application could be made in case of accident,

should be communicated to all officers in charge of parties proceeding to target practice, and such Medical Officer is not to be absent from his quarters or hospital during the period the rifle practice is being carried on.

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Gymnasia.

G. O. 26. 1st March, 1872.

1. Medical Officers in charge of regiments that have been quartered long enough at any station possessing a gymnasium, to enable the men to undergo training, will specially report on the effects, if noticeable, of such training on the muscular development and health of the men on their leaving the station, and as to the general influence of gymnastics in promoting a vigorous constitution. In furtherance of this duty they will frequently visit the gymnasium, and witness the measurements of the recruits on entering the course, and also the measurements on its termination.

2. The Principal Medical Officer will refer to the subject in his annual sanitary reports, giving the substance of the information furnished to him by regimental Medical Officers, with any remarks thereon that he may deem necessary concerning the utility of gymnasia.

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## 3rd.—DEPARTMENTAL CIRCULARS, &c.

Woollen Articles not to be Submitted to the Action of Boiling Water.

6th April, 1871.

With reference to Clause 74, of Army Circulars of 1871, you are requested to point out to all Medical Officers under your supervision, that woollen articles are not to be submitted to the action of boiling water. To Principal Medical Officers at Home and Abroad.

T. G. LOGAN, *Director-General.*

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Army Medical Circular No. 2. 1st February, 1871.

Leave of absence beyond 61 days, reckoning from 1st April in each year, can only be granted to Medical Officers, not attached to regiments, on the recommendation of a Medical Board, *vide* Article 443, Revised Army Regulations, vol I., dated 27th December, 1871.

T. G. LOGAN, *Director-General.*

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Army Medical Circular No. 3. 1st April, 1871.

With reference to General Order No. 66, dated Horse Guards, 1st June, 1869, authorizing Medical Officers in charge of military hospitals, to employ when desirable, and without pay, such convalescents or men suffering from slight venereal complaints as they may deem competent to aid the permanent hospital establishments.

It is hereby directed that the names of all men so detailed, the duties assigned to them, the period each day they may be so employed, shall, in all cases, be stated in the monthly hospital service returns rendered to this department.

T. G. LOGAN, *Director-General.*

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Army Medical Circular No. 4. 21st November, 1871.

The present mode of filling up hospital bed-head tickets (W. O. Form 1145), will be supplemented, in future, by the following additional instructions, viz.:—

"All spaces left blank after insertion of each day's diet and extras to be "at once ruled across, and on discharge of a patient a diagonal line "to be ruled from last day's diet to right hand lower corner. The "date of discharge to be invariably filled in by the prescribing "Medical Officer,"

which will shortly appear as a foot note in a new issue of W. O. Form 1145.

Principal Medical Officers, on their visits and inspections, will see that these details are fully carried out, day by day, reporting any omission to this office.

T. G. LOGAN, *Director-General.*

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## Instructions Regarding Small-pox, Vaccination, and Re-vaccination.

Army Medical Circular No. 6. 1st January, 1872.

THE following instructions regarding small-pox, vaccination, and re-vaccination, are issued for the guidance of medical officers, and will supersede all previous regulations on these points.

Medical Officers to report annually.

The Regimental Surgeon or Medical Officer in charge of a regiment (or detachment) will report yearly whether every man, woman, and child, under his medical care, bears unequivocal marks of either small or cow-pox, and he will keep a register of the names and appearances on the days of examination of all patients vaccinated.

Re-vaccination and Inspection.

In all stations where fresh virus can be procured, every doubtful case, not only of soldiers, but of their wives and children, should undergo re-vaccination.

Whenever small-pox is epidemic, or prevalent, Medical Officers in charge of corps or detachments will exercise more than ordinary care and attention in regard to the condition of vaccination among the troops, their wives and children, and for that purpose they will make a careful inspection of every individual, and at once resort to the operation of vaccination or re-vaccination, not only wherever the marks of vaccination are unsatisfactory or indistinct, or where a long period has elapsed since the date of the operation, but wherever the operation of re-vaccination, previously performed, has been followed by negative results.

Special report of cases of small-pox.

Any cases of small-pox will be immediately reported to the Director-General, in a special report, specifying the name and age of each individual, with the dates of the operations of vaccination and re-vaccination, with their results respectively, and whether such individual bears satisfactory marks, and the number thereof.

All such cases of small-pox will also be invariably noticed in the remarks appended to the weekly return of sick.

To note all cases not bearing marks of vaccination.

If the patient be a soldier, and no marks of vaccination exist, such fact will be mentioned in the said report, with a statement showing the date of his joining the corps, by what Medical Officer examined on enlistment, and with a copy of any note or memorandum transmitted by that Officer to the Regimental Surgeon.

To vaccinate all recruits.

Every recruit, without exception (whether he bears marks of natural small-pox, or of successful vaccination), will be vaccinated on joining the head-quarters or depôt of the corps to which he belongs, unless the operation is certified to have been already successfully performed subsequently to his enlistment into the service, and a monthly return of such cases, in the prescribed form, will be forwarded to the Army Medical Department, showing the number of men, women, and children vaccinated during the month, and the results.

Monthly Return.

Record of vaccination in medical history sheets.

Difficulty having frequently been experienced in ascertaining whether soldiers have been re-vaccinated, from the absence of any record thereof, Medical Officers will be held responsible that in future the medical history sheet of every soldier under their medical charge, shall furnish this information; and, as far as practicable, medical officers will re-vaccinate those cases where no such record exists, and where the medical history sheets contain no place specially set apart for it, the date and result of the operation will be inserted in red ink in the body of the sheet, after the last entry for treatment for disease.

To re-vaccinate women and children during prevalence of small-pox, and soldier's children periodically.

Considering that the wives and children of soldiers are much exposed to the risk of contracting small-pox when prevalent among the civil population, Medical Officers will in future adopt the practice of re-vaccinating the wives of all soldiers, married with leave, as soon as their names are placed on the married roll of any corps, or immediately upon their occupying quarters in barracks, and, as far as possible, this course will be pursued as a measure of public

safety, in the case of the wives of soldiers married without leave, and they will, as a rule, in future subject all soldiers' children to the operation of re-vaccination, whenever ten years has elapsed since the date of their having been vaccinated.

Method of vaccination and source of lymph.

The direct method of vaccination will be had recourse to in preference to that by lymph from tubes or points whenever practicable; it being understood, however, that in vaccination from arm to arm, or in re-vaccination, the lymph is not to be taken from adults, nor from a re-vaccination.

To repeat operation in case of failure.

As it appears from the returns of re-vaccination, that a considerable proportion of the operations are noted as failures, and, as in many instances, no further attempt is made to procure other results, Medical Officers will in all such cases re-vaccinate a second time, with lymph from another source, when practicable; and in the event of the operation still proving unsuccessful, the names of the individuals will be recorded, with a view to their being re-vaccinated at some subsequent date.

Not to use less than two punctures in re-vaccination.

In re-vaccination Medical Officers will not puncture in less than two places, and where the evidence of original vaccination is indistinct, or single, three punctures will be made.

To transmit vaccination certificates to Registrar.

The Lords of Her Majesty's Privy Council having expressed their opinion that it is desirable that the vaccination certificates of soldiers' children, who have been successfully vaccinated, should be transmitted to the registrars, instead of being given to the parents, as heretofore, medical officers will pursue that course in future.

Form of Certificate.

And further, it being very desirable that each certificate transmitted to the registrar should be on the particular form supplied by him to the parents on the registration of birth, Medical Officers will require the production of the form for that purpose. In order to meet cases in which these forms may happen to have been lost, the Registrar-General has prepared books of certificates for the use of Medical Practitioners, which will be supplied to Medical Officers on application.

T. G. Logan, *Director-General.*

**Principal Medical Officers, on their visits and inspections, will see that these details are fully carried out, day by day, reporting any omission to this office.**

T. G. LOGAN, *Director-General.*

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## Instructions Regarding Small-pox, Vaccination, and Re-vaccination.

Army Medical Circular No. 6. 1st January, 1872.

THE following instructions regarding small-pox, vaccination, and re-vaccination, are issued for the guidance of medical officers, and will supersede all previous regulations on these points.

Medical Officers to report annually.

The Regimental Surgeon or Medical Officer in charge of a regiment (or detachment) will report yearly whether every man, woman, and child, under his medical care, bears unequivocal marks of either small or cow-pox, and he will keep a register of the names and appearances on the days of examination of all patients vaccinated.

Re-vaccination and Inspection.

In all stations where fresh virus can be procured, every doubtful case, not only of soldiers, but of their wives and children, should undergo re-vaccination.

Whenever small-pox is epidemic, or prevalent, Medical Officers in charge of corps or detachments will exercise more than ordinary care and attention in regard to the condition of vaccination among the troops, their wives and children, and for that purpose they will make a careful inspection of every individual, and at once resort to the operation of vaccination or re-vaccination, not only wherever the marks of vaccination are unsatisfactory or indistinct, or where a long period has elapsed since the date of the operation, but wherever the operation of re-vaccination, previously performed, has been followed by negative results.

Special report of cases of small-pox.

Any cases of small-pox will be immediately reported to the Director-General, in a special report, specifying the name and age of each individual, with the dates of the operations of vaccination and re-vaccination, with their results respectively, and whether such individual bears satisfactory marks, and the number thereof.

All such cases of small-pox will also be invariably noticed in the remarks appended to the weekly return of sick.

To note all cases not bearing marks of vaccination.

If the patient be a soldier, and no marks of vaccination exist, such fact will be mentioned in the said report, with a statement showing the date of his joining the corps, by what Medical Officer examined on enlistment, and with a copy of any note or memorandum transmitted by that Officer to the Regimental Surgeon.

To vaccinate all recruits.

Every recruit, without exception (whether he bears marks of natural small-pox, or of successful vaccination), will be vaccinated on joining the head-quarters or depôt of the corps to which he belongs, unless the operation is certified to have been already successfully performed subsequently to his enlistment into the service, and a monthly return of such cases, in the prescribed form, will be forwarded to the Army Medical Department, showing the number of men, women, and children vaccinated during the month, and the results.

Monthly Return.

Record of vaccination in medical history sheets.

Difficulty having frequently been experienced in ascertaining whether soldiers have been re-vaccinated, from the absence of any record thereof, Medical Officers will be held responsible that in future the medical history sheet of every soldier under their medical charge, shall furnish this information; and, as far as practicable, medical officers will re-vaccinate those cases where no such record exists, and where the medical history sheets contain no place specially set apart for it, the date and result of the operation will be inserted in red ink in the body of the sheet, after the last entry for treatment for disease.

To re-vaccinate women and children during prevalence of small-pox, and soldier's children periodically.

Considering that the wives and children of soldiers are much exposed to the risk of contracting small-pox when prevalent among the civil population, Medical Officers will in future adopt the practice of re-vaccinating the wives of all soldiers, married with leave, as soon as their names are placed on the married roll of any corps, or immediately upon their occupying quarters in barracks, and, as far as possible, this course will be pursued as a measure of public

safety, in the case of the wives of soldiers married without leave, and they will, as a rule, in future subject all soldiers' children to the operation of re-vaccination, whenever ten years has elapsed since the date of their having been vaccinated.

Method of vaccination and source of lymph.

The direct method of vaccination will be had recourse to in preference to that by lymph from tubes or points whenever practicable; it being understood, however, that in vaccination from arm to arm, or in re-vaccination, the lymph is not to be taken from adults, nor from a re-vaccination.

To repeat operation in case of failure.

As it appears from the returns of re-vaccination, that a considerable proportion of the operations are noted as failures, and, as in many instances, no further attempt is made to procure other results, Medical Officers will in all such cases re-vaccinate a second time, with lymph from another source, when practicable; and in the event of the operation still proving unsuccessful, the names of the individuals will be recorded, with a view to their being re-vaccinated at some subsequent date.

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The Lords of Her Majesty's Privy Council having expressed their opinion that it is desirable that the vaccination certificates of soldiers' children, who have been successfully vaccinated, should be transmitted to the registrars, instead of being given to the parents, as heretofore, medical officers will pursue that course in future.

Form of Certificate.

And further, it being very desirable that each certificate transmitted to the registrar should be on the particular form supplied by him to the parents on the registration of birth, Medical Officers will require the production of the form for that purpose. In order to meet cases in which these forms may happen to have been lost, the Registrar-General has prepared books of certificates for the use of Medical Practitioners, which will be supplied to Medical Officers on application.

T. G. Logan, *Director-General.*

## APPENDIX No. XXI.

ABSTRACT No, 1, showing the Admissions into Hospital, Deaths, and Invaliding among the Troops in the United Kingdom in 1870.

| Diseases. | Household Cavalry. Strength 1,208 | | | Cavalry. 7,965 | | | Royal Artillery. 9,674 | | | Foot Guards. 5,674 | | | Infantry Regiments. 33,823 | | | Depart-mental Corps. 1,655 | | | Roy. Art. Depôt Brigade. 1,770 | | | Depôt Battalions. 8,362 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. |
| I. *General Diseases.* | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Febrile: | | | | | | | | | | | | | | | | | | | | | | | | |
| Small Pox | .. | .. | .. | 3 | .. | .. | 3 | .. | .. | 4 | 1 | .. | 11 | .. | .. | .. | .. | .. | .. | .. | .. | 3 | .. | .. |
| Chicken Pox | 1 | .. | .. | 2 | .. | .. | 1 | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. |
| Measles | 1 | .. | .. | 6 | .. | .. | 13 | .. | .. | 2 | .. | .. | 56 | .. | .. | 1 | .. | .. | 4 | .. | .. | 14 | .. | .. |
| Cow Pox | .. | .. | .. | .. | .. | .. | 8 | .. | .. | .. | .. | .. | 14 | .. | .. | 2 | .. | .. | 4 | .. | .. | 9 | .. | .. |
| Scarlet Fever | 4 | .. | .. | 14 | 1 | .. | 20 | .. | .. | 13 | 1 | .. | 78 | 2 | .. | 2 | .. | .. | 18 | .. | .. | 32 | 2 | .. |
| Typhus „ | .. | .. | .. | 1 | .. | .. | 1 | 1 | .. | 1 | 1 | .. | 3 | 1 | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | .. |
| Enteric „ | 5 | .. | .. | 11 | .. | .. | 3 | 1 | .. | .. | .. | .. | 23 | 8 | .. | 1 | .. | .. | .. | .. | .. | 24 | 5 | .. |
| Simple continued Fever | 2 | .. | .. | 73 | 1 | .. | 77 | .. | .. | 80 | 1 | .. | 340 | 2 | .. | 12 | .. | .. | 5 | .. | .. | 132 | 1 | .. |
| Cerebro-Spinal Fever | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Febricula | 6 | .. | .. | 85 | .. | .. | 81 | .. | .. | 49 | .. | .. | 336 | .. | .. | 4 | .. | .. | 39 | .. | .. | 68 | .. | .. |
| Ague | .. | .. | .. | 12 | .. | .. | 208 | .. | 7 | 1 | .. | .. | 427 | .. | .. | 15 | .. | .. | 16 | .. | .. | 219 | .. | .. |
| Remittent Fever | .. | .. | .. | 8 | .. | .. | 4 | .. | .. | .. | .. | .. | 10 | .. | .. | .. | .. | .. | .. | .. | .. | 13 | .. | .. |
| Simple Cholera | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Choleraic Diarrhœa | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 8 | .. | .. | .. | .. | .. | .. | .. | .. | 5 | 1 | .. |
| Influenza | 2 | .. | .. | 57 | .. | .. | 97 | .. | .. | 48 | .. | .. | 272 | .. | .. | 58 | .. | .. | 179 | .. | .. | 71 | .. | .. |
| Erysipelas | 2 | .. | .. | 12 | 1 | .. | 19 | .. | .. | 11 | .. | .. | 72 | 2 | .. | 4 | .. | .. | 3 | 1 | .. | 24 | .. | .. |
| Pyæmia | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | 1 | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | 1 | .. |
| Mumps | 1 | .. | .. | 6 | .. | .. | 11 | .. | .. | 1 | .. | .. | 42 | .. | .. | 2 | .. | .. | 2 | .. | .. | 36 | .. | .. |
| Hooping Cough | .. | .. | .. | 1 | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Diphtheria | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |

| | | |

Abstract No. 1—*continued.*

| Diseases. | Household Cavalry. | | | Cavalry. | | | Royal Artillery. | | | Foot Guards. | | | Infantry Regiments. | | | Depart-mental Corps. | | | Roy. Art. Depôt Brigade. | | | Depôt Battalions. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Strength .. .. .. .. | 1,208 | | | 7,965 | | | 9,674 | | | 5,674 | | | 33,823 | | | 1,655 | | | 1,770 | | | 8,362 | | |
| | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. |
| Catalepsy .. .. .. .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. |
| Hysteria .. .. .. .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. |
| Chorea .. .. .. .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | 5 | .. | 2 | .. | .. | .. | .. | .. | .. | 1 | .. | .. |
| Neuralgia .. .. .. .. | 3 | .. | .. | 21 | .. | .. | 42 | .. | 1 | 10 | .. | .. | 68 | .. | 1 | 6 | .. | .. | 3 | .. | .. | 30 | .. | .. |
| Mania .. .. .. .. | .. | .. | .. | 2 | .. | 1 | 5 | .. | .. | .. | .. | 1 | 11 | .. | 11 | .. | .. | .. | 1 | 1 | .. | 3 | .. | .. |
| Dementia .. .. .. .. | 3 | .. | 2 | 17 | 1 | 5 | 8 | .. | 5 | 3 | .. | 4 | 33 | .. | 29 | 3 | .. | 1 | 6 | .. | .. | 19 | .. | 1 |
| Spasm of Muscle .. .. .. | .. | .. | .. | 1 | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Hypochondriasis .. .. .. | .. | .. | .. | 3 | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Abscess of Brain .. .. .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Tumour of Brain .. .. .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Convulsions .. .. .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | 6 | .. | .. |
| Neuroma .. .. .. .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Locomotor Ataxy .. .. .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Impediment of Speech .. .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 2. Of the Eye: | | | | | | | | | | | | | | | | | | | | | | | | |
| Conjunctivitis .. .. .. | 6 | .. | .. | 50 | .. | 3 | 75 | .. | 5 | 26 | .. | .. | 424 | .. | 22 | 14 | .. | .. | 9 | .. | .. | 115 | .. | 7 |
| Tarsal Ophthalmia .. .. | 4 | .. | 1 | 1 | .. | .. | 16 | .. | 3 | .. | .. | .. | 51 | .. | 3 | 2 | .. | .. | 4 | .. | .. | 11 | .. | 1 |
| Iritis .. .. .. .. | 1 | .. | .. | 7 | .. | .. | 6 | .. | .. | 5 | .. | .. | 23 | .. | .. | .. | .. | .. | 1 | .. | .. | 4 | .. | .. |
| Cataract .. .. .. .. | .. | .. | 1 | 2 | .. | 1 | 1 | .. | 1 | .. | .. | 1 | 4 | .. | 2 | .. | .. | .. | .. | .. | .. | 2 | .. | 2 |
| Amaurosis .. .. .. .. | .. | .. | .. | 3 | .. | .. | 1 | .. | 1 | .. | .. | .. | 2 | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Short Sight .. .. .. | .. | .. | .. | 1 | .. | .. | .. | .. | 6 | .. | .. | .. | 7 | .. | 20 | .. | .. | 1 | 1 | .. | .. | .. | .. | .. |
| Sclerotitis .. .. .. .. | .. | .. | .. | 1 | .. | .. | 2 | .. | .. | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |

| | | |

Abstract No. 1—*continued.*

| Diseases. | Household Cavalry. | | | Cavalry. | | | Royal Artillery. | | | Foot Guards. | | | Infantry Regiments. | | | Depart-mental Corps. | | | Roy. Art. Depôt. Brigade. | | | Depôt Battalions. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Strength .. .. .. .. | 1,208 | | | 7,965 | | | 9,674 | | | 5,674 | | | 33,823 | | | 1,655 | | | 1,770 | | | 8,362 | | |
| | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. |
| 5. Circulatory System: | | | | | | | | | | | | | | | | | | | | | | | | |
| Pericarditis .. .. .. | .. | .. | .. | 2 | .. | 1 | 1 | 1 | .. | 1 | .. | .. | 12 | .. | 4 | .. | .. | .. | 1 | .. | 1 | 2 | 1 | 1 |
| Adherent Pericardium .. .. | .. | .. | .. | 2 | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Valve Disease of Heart .. .. | .. | .. | 1 | 22 | 2 | 10 | 30 | 7 | 14 | 10 | 4 | 7 | 87 | 10 | 60 | 7 | .. | 2 | 5 | 1 | 2 | 35 | 7 | 28 |
| Hypertrophy „ .. .. | .. | .. | .. | 12 | 1 | 6 | 18 | .. | 8 | 1 | 1 | 3 | 28 | .. | 19 | .. | .. | .. | 2 | .. | 3 | 24 | 1 | 10 |
| Atrophy „ .. .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 2 | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Dilatation „ .. .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | 1 | .. | .. | .. | 1 | .. | .. | 1 | 1 | .. |
| Degeneration „ .. .. | .. | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. | .. | 1 | .. | 1 | .. | 1 | .. | 1 | .. | 1 | .. | 1 |
| Rupture „ .. .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Aneurism „ .. .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 3 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Palpitation .. .. .. | .. | .. | .. | 8 | .. | 2 | 53 | .. | 21 | 6 | .. | .. | 107 | .. | 32 | 1 | .. | 1 | 11 | .. | 4 | 54 | .. | 13 |
| Arteritis .. .. .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Atheroma of Aorta .. .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Rupture „ .. .. | .. | .. | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Degeneration „ .. .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| Rupture of Pulmonary Artery .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Aneurism of Aorta .. .. | 1 | 1 | .. | 6 | 6 | .. | 14 | 10 | 9 | 5 | 6 | .. | 12 | 15 | 4 | 2 | 3 | 1 | .. | .. | 1 | 8 | 4 | 2 |
| Aneurism .. .. .. .. | .. | .. | .. | 3 | .. | 1 | 2 | .. | .. | 2 | .. | .. | 3 | 1 | 1 | 1 | .. | .. | .. | .. | .. | 2 | 1 | .. |
| Phlebitis .. .. .. .. | 1 | .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Obliteration of Veins .. .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | 1 | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Varicose Veins .. .. .. | 3 | .. | 1 | 4 | .. | 12 | 16 | .. | 17 | 1 | .. | 1 | 56 | .. | 43 | .. | .. | 1 | 1 | .. | 2 | 13 | .. | 9 |
| Syncope .. .. .. | .. | .. | .. | 1 | .. | .. | 1 | .. | 1 | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | 2 | .. | .. |
| Angina Pectoris .. .. .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |

| | | |

Abstract No. 1—*continued.*

| Diseases. | Household Cavalry. | | | Cavalry. | | | Royal Artillery. | | | Foot Guards. | | | Infantry Regiments. | | | Depart-mental Corps. | | | Roy. Art. Depôt Brigade. | | | Depôt Battalions. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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| | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. |
| Caries of the Alveoli | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Glossitis | .. | .. | .. | 1 | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Ulcer of Tongue | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Sore Throat | .. | .. | .. | 31 | .. | .. | 13 | .. | .. | 2 | .. | .. | 26 | .. | .. | .. | .. | .. | 1 | .. | .. | 37 | .. | .. |
| Quinsy | .. | .. | .. | 1 | .. | .. | 8 | .. | .. | 2 | .. | .. | 5 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Tonsillitis | .. | .. | .. | 242 | .. | .. | 348 | .. | .. | 181 | .. | .. | 1378 | .. | .. | 56 | .. | .. | 158 | .. | .. | 441 | .. | .. |
| Perforation of the Palate | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Pharyngitis | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Abscess of the Salivary Glands | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Œsophagitis | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Gastritis | .. | .. | .. | 1 | .. | 1 | 3 | 1 | .. | .. | .. | .. | 4 | .. | 1 | .. | .. | .. | 1 | .. | .. | 1 | .. | .. |
| Hæmatemesis | .. | .. | .. | .. | 1 | .. | .. | .. | .. | 2 | .. | .. | 3 | .. | .. | .. | .. | .. | 1 | .. | .. | 1 | 1 | .. |
| Dyspepsia | .. | .. | .. | 114 | .. | 4 | 229 | .. | 1 | 107 | .. | 1 | 451 | .. | 3 | 28 | .. | .. | 36 | .. | 3 | 152 | .. | 3 |
| Vomiting | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | 3 | .. | .. |
| Enteritis | .. | .. | .. | 1 | .. | .. | 2 | 1 | .. | .. | .. | .. | 5 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Typhlitis | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | 1 | .. | .. |
| Dysentery | .. | .. | .. | 5 | .. | .. | 19 | .. | 2 | .. | .. | .. | 36 | 1 | 3 | .. | .. | .. | 4 | .. | .. | 43 | 1 | 1 |
| Perforation of the Intestines | .. | .. | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | .. |
| Fæcal Abscess | .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Hæmorrhage of Intestines | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Obstruction of Intestines | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Internal Strangulation of Bowel | .. | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Hernia | .. | .. | .. | 10 | .. | 22 | 19 | .. | 26 | 4 | .. | 2 | 72 | .. | 67 | 2 | .. | 8 | 4 | .. | 1 | 24 | .. | 6 |
| Tænia Solium | .. | .. | .. | 1 | .. | .. | 20 | .. | .. | .. | .. | .. | 17 | .. | .. | .. | .. | .. | 2 | .. | .. | 9 | .. | .. |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ascaris Lumbricoides | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | 2 | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Bothriocephalus Latus | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Diarrhœa | .. | .. | .. | .. | 10 | .. | .. | 59 | .. | .. | 115 | .. | .. | 93 | .. | .. | 311 | .. | 4 | 23 | .. | .. | 43 | .. | .. | 132 | .. | 3 | .. |
| Colic | .. | .. | .. | .. | 7 | .. | .. | 9 | .. | .. | 34 | .. | .. | 31 | .. | .. | 94 | .. | .. | 4 | .. | .. | 23 | .. | .. | 29 | .. | .. | .. |
| Constipation | .. | .. | .. | .. | 1 | .. | .. | 6 | .. | .. | 8 | .. | .. | 1 | .. | .. | 25 | .. | .. | .. | .. | .. | 1 | .. | .. | 13 | .. | .. | .. |
| Abscess of Anus | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Fissure of Anus | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Prolapsus of Anus | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. |
| Condyloma of Anus | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | 2 | .. | .. | .. | .. | .. | 18 | .. | .. | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. |
| Fistula in Ano | .. | .. | .. | .. | 2 | .. | .. | 3 | .. | .. | 9 | .. | .. | 2 | .. | .. | 23 | .. | 2 | 1 | .. | .. | 1 | .. | 1 | 4 | .. | .. | .. |
| Pruritus | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| Ulceration of Rectum | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. |
| Abscess of Rectum | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Fissure of Rectum | .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Prolapsus of Rectum | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| Hæmorrhoids | .. | .. | 2 | .. | .. | 18 | .. | 1 | 38 | .. | .. | 10 | .. | .. | 122 | .. | .. | 6 | .. | 1 | 4 | .. | .. | 44 | .. | .. | .. | .. | .. |
| Hepatitis | .. | .. | .. | .. | .. | 33 | 2 | 1 | 68 | 2 | 15 | 3 | .. | 1 | 139 | 2 | 32 | 1 | .. | 1 | 10 | 1 | 2 | 113 | 2 | 16 | .. | .. | .. |
| Congestion of Liver | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Cirrhosis | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | 2 | 1 | 1 | 2 | 3 | 1 | .. | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. |
| Lardaceous Liver | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 2 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Parasitic Disease of Liver | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Jaundice | .. | .. | .. | .. | 5 | .. | .. | 35 | 1 | .. | 30 | .. | .. | 37 | .. | .. | 106 | .. | .. | 4 | .. | .. | 3 | .. | .. | 17 | .. | .. | .. |
| Splenitis | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | 3 | .. | .. | .. | .. | .. | 15 | .. | 1 | .. | .. | .. | .. | .. | .. | 8 | .. | .. | .. |
| Peritonitis | .. | .. | .. | .. | .. | .. | .. | 3 | 2 | .. | 2 | 1 | .. | .. | 1 | .. | 6 | 1 | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| Ascites | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | 6 | 2 | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| Tumour | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Abscess | .. | .. | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 10. Urinary System: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bright's Disease | .. | .. | .. | 2 | 1 | 1 | 7 | 2 | 2 | 13 | 3 | 5 | 2 | .. | 3 | 17 | 3 | 3 | 1 | 1 | .. | .. | .. | .. | 7 | 3 | 1 | .. | .. |
| Nephritis | .. | .. | .. | .. | .. | .. | 2 | .. | 1 | 3 | .. | 1 | 3 | .. | .. | 10 | .. | .. | 1 | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. |
| Gonorrhœa | .. | .. | .. | 46 | .. | .. | 599 | .. | .. | 924 | .. | .. | 368 | .. | .. | 3198 | .. | .. | 116 | .. | .. | 217 | .. | .. | 1008 | .. | .. | .. | .. |
| Gleet | .. | .. | .. | 2 | .. | .. | 6 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Phimosis, &c. | .. | .. | .. | 1 | .. | .. | 6 | .. | .. | 7 | .. | .. | 6 | .. | .. | 38 | .. | .. | .. | .. | .. | .. | .. | .. | 8 | .. | .. | .. | .. |
| Condyloma | .. | .. | .. | .. | .. | .. | 1 | .. | .. | 4 | .. | .. | 5 | .. | .. | 10 | .. | .. | 1 | .. | .. | 3 | .. | .. | 2 | .. | .. | .. | .. |
| Bubo | .. | .. | .. | 1 | .. | .. | 15 | .. | .. | 22 | .. | .. | 1 | .. | .. | 50 | .. | .. | 2 | .. | .. | 12 | .. | .. | 18 | .. | .. | .. | .. |

Abstract No. 1—*continued.*

| Diseases. | Household Cavalry. | | | Cavalry. | | | Royal Artillery. | | | Foot Guards. | | | Infantry Regiments. | | | Depart-mental Corps. | | | Roy. Art. Depôt Brigade. | | | Depôt Battalions. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Strength | 1,208 | | | 7,965 | | | 9,674 | | | 5,674 | | | 33,823 | | | 1,655 | | | 1,770 | | | 8,362 | | |
| | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. |
| Epididymitis Gonorrhœal | 2 | .. | .. | 22 | .. | .. | 31 | .. | .. | 39 | .. | .. | 126 | .. | .. | 3 | .. | .. | 1 | .. | .. | 23 | .. | .. |
| Stricture of Urethra | 1 | .. | .. | 11 | .. | 5 | 26 | .. | 3 | 15 | .. | 1 | 75 | .. | 10 | 2 | .. | .. | 3 | .. | .. | 29 | .. | 4 |
| Extravasation of Urine | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Incontinence of Urine | .. | .. | .. | 5 | .. | 1 | 7 | .. | 2 | .. | .. | .. | 23 | .. | .. | .. | .. | .. | .. | .. | .. | 9 | .. | 2 |
| Retention of Urine | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | 2 | .. | .. |
| Suppression of Urine | .. | .. | .. | .. | .. | 1 | 3 | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Urinary Fistula | .. | .. | .. | 5 | .. | 1 | 2 | .. | 1 | .. | .. | .. | 3 | .. | .. | 1 | .. | .. | 1 | .. | 1 | 2 | .. | .. |
| ,, Abscess | 1 | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | 6 | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. |
| Cystitis | 2 | .. | .. | 1 | .. | .. | 5 | .. | .. | 2 | .. | .. | 8 | .. | 1 | 1 | .. | .. | .. | .. | .. | 4 | .. | .. |
| Hæmaturia | .. | .. | .. | 1 | .. | .. | 3 | .. | 1 | 1 | .. | .. | 2 | .. | .. | 1 | .. | .. | .. | .. | .. | 2 | .. | .. |
| Calculus | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | 1 | .. | .. | 1 | .. | .. |
| Hæmorrhage from Urethra | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Diuresis | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Irritability of Bladder | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 5 | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. |
| Inflammation of Prostrate Gland | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 11. Generative System: | | | | | | | | | | | | | | | | | | | | | | | | |
| Varicocele | .. | .. | 1 | 3 | .. | 1 | 5 | .. | .. | 1 | .. | 1 | 9 | .. | 1 | .. | .. | .. | 1 | .. | .. | 1 | .. | 1 |
| Hydrocele | .. | .. | .. | 7 | .. | 1 | 14 | .. | 1 | 2 | .. | 1 | 25 | .. | 1 | 2 | .. | .. | 1 | .. | 1 | 11 | .. | .. |
| Orchitis | 7 | .. | .. | 102 | .. | 3 | 143 | .. | .. | 26 | .. | .. | 295 | .. | 10 | 20 | .. | .. | 15 | .. | .. | 99 | .. | 3 |
| Hæmatocele | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Abscess of Testicle | .. | .. | .. | .. | .. | .. | .. | .. | .. | 2 | .. | .. | 1 | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Hernia Testis | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Malposition of Testicle | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | 1 | .. | .. | .. |

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Abstract No. 1—*continued.*

| | Household Cavalry. | | | Cavalry. | | | Royal Artillery. | | | Foot Guards. | | | Infantry Regiments. | | | Depart-mental Corps. | | | Roy. Art. Depôt Brigade. | | | Depôt Battalions. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Strength .. .. .. .. | 1,208 | | | 7,965 | | | 9,674 | | | 5,674 | | | 33,823 | | | 1,655 | | | 1,770 | | | 8,362 | | |
| Diseases. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. |
| Atrophy of Muscle .. .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. |
| Curvature of Spine .. .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | 1 | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | 1 |
| 13. Of Cellular Tissue: | | | | | | | | | | | | | | | | | | | | | | | | |
| Inflammation of Cellular Tissue . | 2 | .. | .. | 27 | .. | .. | 20 | .. | .. | 8 | .. | .. | 140 | 1 | 1 | 4 | .. | .. | 1 | .. | .. | 46 | .. | .. |
| Abscess " " | 25 | .. | .. | 150 | .. | 2 | 169 | .. | 1 | 131 | .. | 3 | 530 | .. | 3 | 18 | .. | .. | 24 | .. | 1 | 151 | 1 | 1 |
| Emphysema .. .. .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Gelatinous Cyst .. .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Tumour .. .. .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Fibro-Cellular Tumour .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Guinea Worm .. .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. |
| | | | | | | | | | | | | | | | | | | | | | | 1 | .. | .. |
| 14. Cutaneous System: | | | | | | | | | | | | | | | | | | | | | | | | |
| Urticaria .. .. .. .. | .. | .. | .. | 4 | .. | .. | 3 | .. | .. | 3 | .. | .. | 7 | .. | .. | .. | .. | .. | .. | .. | .. | 4 | .. | .. |
| Lichen .. .. .. .. | 1 | .. | .. | .. | .. | .. | 3 | .. | .. | 1 | .. | .. | 9 | .. | .. | .. | .. | .. | 1 | .. | .. | 1 | .. | .. |
| Psoriasis .. .. .. .. | 1 | .. | .. | 3 | .. | .. | 9 | .. | .. | 2 | .. | .. | 38 | .. | .. | 4 | .. | .. | .. | .. | .. | 11 | .. | 1 |
| Herpes .. .. .. .. | 4 | .. | .. | 8 | .. | .. | 20 | .. | .. | 3 | .. | .. | 43 | .. | .. | 1 | .. | .. | 8 | .. | .. | 21 | .. | .. |
| Eczema .. .. .. .. | 11 | .. | .. | 41 | .. | 1 | 79 | .. | 1 | 29 | .. | .. | 320 | .. | 3 | 6 | .. | .. | 10 | .. | .. | 81 | .. | 1 |
| Impetigo .. .. .. .. | .. | .. | .. | 4 | .. | .. | 2 | .. | .. | 1 | .. | .. | 21 | .. | .. | .. | .. | .. | .. | .. | .. | 5 | .. | .. |
| Ulcer .. .. .. .. | 30 | .. | .. | 396 | .. | 8 | 321 | .. | 9 | 85 | .. | 1 | 727 | .. | 7 | 50 | .. | .. | 67 | .. | .. | 305 | .. | 10 |
| Boil .. .. .. .. | 19 | .. | .. | 308 | .. | .. | 230 | .. | .. | 34 | .. | .. | 605 | .. | .. | 41 | .. | .. | 29 | .. | .. | 179 | .. | .. |
| Carbuncle .. .. .. .. | 3 | .. | .. | 10 | .. | .. | 11 | .. | .. | 1 | .. | .. | 10 | .. | .. | 1 | .. | .. | .. | .. | .. | 3 | .. | .. |
| Whitlow .. .. .. .. | 6 | .. | .. | 27 | .. | .. | 49 | .. | .. | 1 | .. | .. | 121 | .. | .. | 5 | .. | .. | 11 | .. | .. | 35 | .. | .. |
| Itch .. .. .. .. | 2 | .. | .. | 34 | .. | .. | 95 | .. | .. | 43 | .. | .. | 679 | .. | .. | 10 | .. | .. | 61 | .. | .. | 268 | .. | .. |

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Abstract No. 1—*continued.*

| Diseases. | Household Cavalry. | | | Cavalry. | | | Royal Artillery. | | | Foot Guards. | | | Infantry Regiments. | | | Departmental Corps. | | | Roy. Art. Depôt Brigade. | | | Depôt Battalion. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Strength | 1,028 | | | 7,965 | | | 9,674 | | | 5,674 | | | 33,823 | | | 1,655 | | | 1,770 | | | 8,362 | | |
| | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. | Admitted. | Died. | Invalided. |
| V. *Injuries.* | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. Accidental: | | | | | | | | | | | | | | | | | | | | | | | | |
| Burns and Scalds | .. | .. | .. | 8 | .. | .. | 18 | .. | .. | 11 | .. | .. | 101 | .. | 1 | 4 | .. | .. | 3 | .. | .. | 34 | .. | 1 |
| Multiple Injury | .. | .. | .. | .. | .. | .. | 1 | .. | 1 | 1 | .. | 1 | 2 | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Multiple Injury by Railway | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Asphyxia by Drowning | .. | .. | .. | .. | 1 | .. | .. | 1 | .. | .. | 3 | .. | .. | 9 | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Exposure to Cold | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Contusion | .. | .. | 49 | .. | .. | 466 | .. | 2 | 621 | .. | 8 | 74 | .. | .. | 961 | 1 | 1 | 80 | .. | .. | 103 | .. | .. | 273 | .. | 1 |
| Concussion of the Brain | .. | .. | 1 | .. | .. | 3 | .. | .. | 1 | .. | .. | 2 | .. | .. | 5 | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Fracture | .. | .. | 3 | .. | 1 | 48 | 2 | 13 | 43 | 1 | 4 | 16 | .. | 1 | 120 | 5 | 16 | 9 | .. | .. | 7 | .. | 1 | 33 | .. | 5 |
| Wounds | .. | .. | 28 | .. | .. | 128 | .. | 1 | 160 | .. | .. | 69 | .. | 2 | 471 | .. | 1 | 23 | .. | .. | 26 | .. | 3 | 114 | .. | .. |
| „ from Gunshot | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | 1 | 2 | .. | .. | 12 | 1 | .. | .. | .. | .. | .. | .. | .. | 2 | .. | .. |
| Sprain | .. | .. | 22 | .. | .. | 181 | .. | 2 | 197 | .. | 2 | 85 | .. | 1 | 737 | .. | 4 | 38 | .. | .. | 58 | .. | .. | 188 | .. | 3 |
| Dislocation | .. | .. | .. | .. | .. | 12 | 1 | 2 | 1 | .. | .. | .. | .. | .. | 29 | .. | 4 | .. | .. | .. | .. | .. | .. | 8 | .. | .. |
| Blisters of the Feet | .. | .. | .. | .. | .. | 12 | .. | .. | 35 | .. | .. | 3 | .. | .. | 194 | .. | .. | .. | .. | .. | 20 | .. | .. | 94 | .. | .. |
| Privation | .. | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Bite of Horse | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| „ Dog | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Injury to Eye | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Foreign body embedded | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Asphyxia by crushing when drunk | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3. Homicidal: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fracture of Skull | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Concussion of Brain | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| Stab | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 4. Self-inflicted: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cut Throat | .. | .. | .. | .. | .. | .. | 1 | 1 | .. | 1 | 1 | 1 | 2 | .. | 1 | 4 | 2 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. |
| Poison | .. | .. | .. | .. | .. | .. | 1 | 1 | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Gunshot Wound | .. | .. | .. | .. | .. | .. | .. | 3 | .. | .. | .. | .. | .. | .. | .. | 1 | 5 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| By Railway | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Hanging | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Concussion of Brain | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| VI. *Surgical Operations.* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Amputation of Thigh | .. | .. | .. | .. | .. | 1 | .. | 1 | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | 2 | .. | .. |
| ,, Leg | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| ,, Toe | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| ,, Finger | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | 2 | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| Excision of Tumour | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Cicatrix of Eyelid | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Ligature of Internal Iliac Artery | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| No appreciable Disease | .. | .. | .. | .. | .. | 2 | .. | .. | 13 | .. | .. | 5 | .. | .. | 29 | .. | .. | .. | .. | .. | 2 | .. | .. | 16 | .. | .. | .. | .. | .. | .. |
| Total | .. | .. | 715 | 12 | 21 | 5735 | 68 | 292 | 7,668 | 83 | 375 | 3557 | 52 | 131 | 23,919 | 267 | 1061 | 995 | 17 | 37 | 1820 | 19 | 49 | 7,790 | 95 | 344 | | | | |

APPENDIX No. XXI—*continued.*

ABSTRACT No. 2, showing the Number of Men belonging to the Regiments serving at Home who were Vaccinated during the Year 1870.

| | Results. | In those who bore Marks of previous Small-pox. | In those who bore good Marks of previous Vaccination. | In those who bore doubtful Marks of previous Vaccination. | In those who bore no Marks of previous Vaccination or Small-pox. | Total. |
|---|---|---|---|---|---|---|
| Soldiers, not Recruits. | A perfect vaccine pustule | 44 | 385 | 221 | 96 | 746 |
| | A modified ditto | 42 | 432 | 332 | 51 | 857 |
| | A failure in .. .. | 43 | 327 | 260 | 42 | 672 |
| | Total .. .. | 129 | 1,144 | 813 | 189 | 2,275 |
| Recruits. | A perfect vaccine pustule | 444 | 6,522 | 248 | 624 | 7,838 |
| | A modified ditto | 423 | 6,553 | 162 | 231 | 7,369 |
| | A failure in .. .. | 460 | 5,199 | 89 | 193 | 5,941 |
| | Total .. .. | 1,327 | 18,274 | 499 | 1,048 | 21,148 |

## APPENDIX No. XXI.—*continued.*

ABSTRACT No. 3, showing the Ages of the Troops serving in the United Kingdom, and the Deaths at each Age, during the Year 1870.

| | Under 20. | | 20 and under 25. | | 25 and under 30. | | 30 and under 35. | | 35 and under 40. | | 40 and upwards. | | Total. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. |
| Household Cavalry .. .. | 110 | .. | 386 | 4 | 300 | 6 | 183 | 2 | 128 | .. | 101 | .. | 1,208 | 12 |
| Cavalry of the Line .. .. | 1,207 | 2 | 2,394 | 16 | 1,986 | 7 | 1,614 | 22 | 555 | 15 | 209 | 6 | 7,965 | 68 |
| Royal Artillery .. .. .. | 2,097 | 4 | 2,613 | 11 | 2,121 | 14 | 1,852 | 26 | 843 | 26 | 148 | 2 | 9,674 | 83 |
| Foot Guards .. .. .. | 1,299 | 4 | 1,701 | 15 | 1,381 | 13 | 846 | 10 | 385 | 9 | 62 | 1 | 5,674 | 52 |
| Infantry Regiments .. .. | 8,241 | 18 | 8,269 | 50 | 7,447 | 44 | 7,077 | 99 | 2,421 | 44 | 368 | 12 | 33,823 | 267 |
| Total .. .. .. | 12,954 | 28 | 15,363 | 96 | 13,235 | 84 | 11,572 | 159 | 4,332 | 94 | 888 | 21 | 58,344 | 482 |
| Depôt Brigade, R.A. .. .. | 907 | .. | 292 | 1 | 253 | 3 | 204 | 5 | 82 | 6 | 32 | 4 | 1,770 | 19 |
| Depôts, Line .. .. .. | 2,358 | 10 | 1,778 | 20 | 1,507 | 9 | 1,549 | 31 | 930 | 20 | 240 | 5 | 8,362 | 95 |
| Coast Brigade, R.A. .. .. | 3 | .. | 26 | .. | 180 | 1 | 811 | 8 | 317 | 16 | 218 | 4 | 1,555 | 29 |
| Total .. .. .. | 3,268 | 10 | 2,096 | 21 | 1,940 | 13 | 2,564 | 44 | 1,329 | 42 | 490 | 13 | 11,687 | 143 |

APPENDIX No. XXI—*continued.*

ABSTRACT No. 4, showing the Number of Recruits Inspected, and the Number found unfit for Service in each of the Recruiting Districts, during the Year 1870.

| Districts. | | Primary Inspections. | Secondary Inspections. | | Total. |
|---|---|---|---|---|---|
| | | | Had been previously examined by Staff Surgeon or other Army Medical Officer. | Had been previously examined by Private Medical Practitioner. | |
| London .. | Inspected .. .. | 7,917 | 331 | 1,956 | 10,204 |
| | Rejected .. .. | 2,252 | 14 | 152 | 2,418 |
| Liverpool .. | Inspected .. .. | 1,039 | 64 | 254 | 1,357 |
| | Rejected .. .. | 369 | 7 | 47 | 423 |
| Bristol .. | Inspected .. .. | 380 | 22 | 593 | 995 |
| | Rejected .. .. | 163 | 9 | 94 | 266 |
| York .. | Inspected .. .. | 202 | 318 | 211 | 731 |
| | Rejected .. .. | 68 | 21 | 39 | 128 |
| Birmingham .. | Inspected .. .. | 565 | 74 | 200 | 839 |
| | Rejected .. .. | 138 | 2 | 25 | 165 |
| Devonport .. | Inspected .. .. | 243 | 52 | 224 | 519 |
| | Rejected .. .. | 83 | 7 | 27 | 117 |
| Manchester .. | Inspected .. .. | 677 | 17 | 96 | 790 |
| | Rejected .. .. | 327 | 5 | 29 | 361 |
| Peterborough | Inspected .. .. | 83 | 17 | 639 | 739 |
| | Rejected .. .. | 26 | 1 | 70 | 97 |
| Portsmouth .. | Inspected .. .. | 438 | 52 | 400 | 890 |
| | Rejected .. .. | 205 | 6 | 36 | 247 |
| Edinburgh .. | Inspected .. .. | 396 | 1 | 6 | 403 |
| | Rejected .. .. | 116 | .. | 3 | 119 |
| Glasgow .. | Inspected .. .. | 836 | 62 | 40 | 938 |
| | Rejected .. .. | 388 | 8 | 15 | 411 |
| Inverness .. | Inspected .. .. | 26 | .. | 8 | 34 |
| | Rejected .. .. | 3 | .. | .. | 3 |
| Belfast .. | Inspected .. .. | 42 | 2 | 15 | 59 |
| | Rejected .. .. | 7 | .. | 3 | 10 |
| Dublin .. | Inspected .. .. | 842 | 309 | 215 | 1,366 |
| | Rejected .. .. | 309 | 23 | 24 | 356 |
| Total | Inspected .. | 13,686 | 1,321 | 4,857 | 19,864 |
| | Rejected .. | 4,454 | 103 | 564 | 5,121 |

APPENDIX No. XXI—*continued.*

ABSTRACT No. 5, showing the Native Country of the Recruits inspected at the Head Quarters of each of the Districts in 1870.

| Districts. | England. | | Wales. | | Scotland. | | Ireland. | | British Colonies or Foreign Countries. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Inspected. | Rejected. | Inspected. | Rejected. | Inspected. | Rejected. | Inspected. | Rejected. | Inspected. | Rejected. |
| London .. | 7,580 | 2,147 | 10 | 3 | 103 | 24 | 190 | 66 | 34 | 12 |
| Liverpool .. | 730 | 270 | 44 | 9 | 55 | 12 | 199 | 54 | 11 | 4 |
| Bristol .. | 239 | 119 | 91 | 22 | 7 | 2 | 41 | 19 | 2 | 1 |
| York .. | 187 | 65 | .. | .. | 10 | 3 | 5 | .. | .. | .. |
| Birmingham . | 541 | 130 | .. | .. | 4 | 2 | 16 | 4 | 4 | 2 |
| Devonport .. | 228 | 76 | 3 | 1 | 2 | 1 | 7 | 3 | 3 | 2 |
| Manchester .. | 547 | 269 | .. | .. | 19 | 7 | 102 | 46 | 9 | 5 |
| Peterborough | 83 | 26 | .. | .. | .. | .. | .. | .. | .. | .. |
| Portsmouth .. | 419 | 196 | 2 | 1 | 9 | 5 | 7 | 2 | 2 | 1 |
| Edinburgh .. | 16 | 3 | .. | .. | 364 | 109 | 16 | 4 | .. | .. |
| Glasgow .. | 38 | 19 | .. | .. | 577 | 269 | 219 | 98 | 2 | 2 |
| Inverness .. | .. | .. | .. | .. | 26 | 3 | .. | .. | .. | .. |
| Belfast .. | 1 | .. | .. | .. | 1 | .. | 40 | 7 | .. | .. |
| Dublin .. | 32 | 10 | .. | .. | 7 | 2 | 798 | 296 | 5 | 1 |
| Total .. | 10,641 | 3,350 | 150 | 36 | 1,183 | 439 | 1,640 | 599 | 72 | 30 |

ABSTRACT No. 6, showing the Ages of Recruits Inspected in 1870.

| | Boys under 17. | From 17 to 18. | From 18 to 19. | From 19 to 20. | From 20 to 21. | From 21 to 22. | From 22 to 23. | From 23 to 24. | From 24 to 25. | 25 and upwards. |
|---|---|---|---|---|---|---|---|---|---|---|
| At Head Quarters of Recruiting Districts* ... ... | 145 | 700 | 4,496 | 2,848 | 1,698 | 1,207 | 890 | 723 | 680 | 211 |
| At Regiments and Depôts† ... | 493 | 2,355 | 4,786 | 2,798 | 1,788 | 1,194 | 1,004 | 846 | 585 | 216 |
| By Civil Medical Practitioners ... | 23 | 499 | 2,672 | 2,148 | 1,112 | 711 | 592 | 432 | 399 | 66 |
| Total ... ... | 661 | 3,554 | 11,954 | 7,794 | 4,598 | 3,112 | 2,486 | 2,001 | 1,664 | 493 |

* Information given concerning 13,598 Recruits only.

† In one regiment, which has since embarked for India, the ages of Recruits "found fit," instead of those "inspected," having been given, the total number is less by 3 than that of recruits primarily inspected at regiments and depôts.

APPENDIX No. XXI—*continued.*

ABSTRACT No. 7, showing the Heights of the Recruits Inspected in 1870.

| | Under 5 ft. 3 in. | From 5 ft. 3 in. to 5 ft. 4 in. | From 5 ft. 4 in. to 5 ft. 5 in. | From 5 ft. 5 in. to 5 ft. 6 in. | From 5 ft. 6 in. to 5 ft. 7 in. | From 5 ft. 7 in. to 5 ft. 8 in. | From 5 ft. 8 in. to 5 ft. 9 in. | From 5 ft. 9 in. to 5 ft. 10 in. | From 5 ft. 10 in. to 5 ft. 11 in. | From 5 ft. 11 in. to 6 ft. | 6 ft. and upwards. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| At Head Quarters of Recruiting Districts ... | 143 | 75 | 1,300 | 4,581 | 3,514 | 2,042 | 1,031 | 610 | 214 | 103 | 73 |
| At Regiments & Depôts. * | 363 | 546 | 3,057 | 3,995 | 3,070 | 2,387 | 1,351 | 649 | 322 | 194 | 131 |
| By Civil Medical Practitioners ... ... | 26 | 9 | 566 | 2,422 | 2,256 | 1,474 | 964 | 532 | 247 | 106 | 52 |
| Total ... ... | 532 | 630 | 4,923 | 10,998 | 8,840 | 5,903 | 3,346 | 1,791 | 783 | 403 | 256 |

* See second note to Abstract No. 6, explaining a discrepancy of 3 in the total number of Recruits primarily inspected at regiments and depôts.

ABSTRACT No. 8, showing the Number of Recruits inspected in 1870, at the Head-Quarters of Recruiting Districts, at the following Weights and Ages.

| Ages. | Under 100 lbs. | From 100 lbs. to 110 lbs. | From 110 lbs. to 120 lbs. | From 120 lbs. to 130 lbs. | From 130 lbs. to 140 lbs. | From 140 lbs. to 150 lbs. | From 150 lbs. to 160 lbs. | From 160 lbs. to 170 lbs. | From 170 lbs. and upwards. | Total. |
|---|---|---|---|---|---|---|---|---|---|---|
| Boys under 17 ... ... ... | 129 | 13 | 2 | ... | 1 | ... | ... | ... | ... | 145 |
| From 17 to 18 ... ... ... | ... | 51 | 214 | 250 | 140 | 30 | 10 | 4 | 1 | 700 |
| „ 18 to 19 ... ... ... | 12 | 271 | 1,373 | 1,652 | 882 | 232 | 57 | 14 | 3 | 4,496 |
| „ 19 to 20 ... ... .. | 9 | 116 | 598 | 1,037 | 690 | 275 | 96 | 21 | 6 | 2,848 |
| „ 20 to 21 ... ... ... | 2 | 23 | 197 | 560 | 533 | 244 | 99 | 34 | 6 | 1,698 |
| „ 21 to 22 ... ... ... | ... | 8 | 132 | 326 | 347 | 252 | 98 | 33 | 11 | 1,207 |
| „ 22 to 23 ... ... .. | 1 | 1 | 93 | 221 | 254 | 190 | 78 | 40 | 12 | 890 |
| „ 23 to 24 ... ... ... | ... | ... | 59 | 157 | 207 | 172 | 71 | 39 | 18 | 723 |
| „ 24 to 25 ... ... ... | ... | 1 | 56 | 142 | 198 | 135 | 90 | 39 | 19 | 680 |
| Upwards of 25 ... ... ... | ... | 2 | 15 | 50 | 58 | 46 | 21 | 10 | 9 | 211 |
| Total ... ... | 153 | 486 | 2,739 | 4,395 | 3,310 | 1,576 | 620 | 234 | 85 | 13,598 |

APPENDIX No. XXI—*continued.*

ABSTRACT No. 9, showing the State of Education of the Recruits examined at the Head Quarters of the Recruiting Districts and at Regiments and Depôts in 1870.

| | Well Educated. | Able to Write. | Able to Read only. | Unable to Read. | Total. |
|---|---|---|---|---|---|
| Recruiting Districts .. | 747 | 9,530 | 1,111 | 2,298 | 13,686 |
| Regiments and Depôts | 1,173 | 9,644 | 2,024 | 3,227 | 16,068 |
| Total .. .. | 1,920 | 19,174 | 3,135 | 5,525 | 29,754 |

APPENDIX No. XXI—*continued.*

ABSTRACT No. 10, showing the Admissions into Hospital and Deaths, among the Troops serving in the Mediterranean during the year 1870; and the Disabilities of the Invalids sent to England and of those discharged the service in Malta and at Netley during the same period.

| Stations | Gibraltar. | | Malta. | | Native Troops. R. Malta Fencibles. | | Gibraltar. | | Malta. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Strength | 4,397 | | 4,799 | | 568 | | Invalids. | | Invalids. | | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Sent Home. | Discharged at Netley. | Sent Home. | Discharged at Malta. | Discharged at Netley. |
| *1. General Diseases.* | | | | | | | | | | | |
| 1. Febrile: | | | | | | | | | | | |
| Small Pox | 8 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Measles | 7 | .. | 1 | .. | 1 | .. | .. | .. | .. | .. | .. |
| Scarlet Fever | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Typhus „ | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. |
| Enteric „ | 4 | 3 | 6 | .. | 1 | .. | .. | .. | .. | .. | .. |
| Simple Continued Fever | 189 | 1 | 430 | 5 | 6 | 1 | 4 | .. | 2 | .. | .. |
| Febricula | 179 | .. | 196 | .. | 13 | .. | .. | .. | .. | .. | .. |
| Ague | 11 | .. | 4 | .. | .. | .. | .. | .. | .. | .. | .. |
| Remittent Fever | 36 | .. | 5 | 1 | .. | .. | 3 | 1 | .. | .. | .. |
| Influenza | 2 | .. | 3 | .. | .. | .. | .. | .. | .. | .. | .. |
| Erysipelas | 5 | .. | 4 | .. | .. | .. | .. | .. | .. | .. | .. |
| 2. Constitutional: | | | | | | | | | | | |
| Acute Rheumatism | 63 | 1 | 77 | .. | 14 | .. | 2 | .. | .. | .. | .. |
| Chronic „ | 112 | .. | 82 | .. | 3 | .. | 11 | 9 | 13 | 2 | 6 |
| Muscular „ | 24 | .. | 123 | .. | 19 | .. | .. | .. | 2 | .. | .. |
| Gout | 2 | .. | 2 | .. | .. | .. | 1 | .. | .. | .. | .. |
| Chronic Osteo-Arthritis | 1 | .. | 1 | .. | .. | .. | .. | .. | 1 | .. | .. |
| Primary Syphilis | 182 | .. | 24 | .. | 8 | .. | .. | .. | .. | .. | .. |
| Secondary „ | 78 | .. | 14 | .. | .. | .. | 13 | 4 | 6 | .. | 4 |
| Cancer | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 |
| Rodent Ulcer | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. |
| Scrofula | 6 | .. | 4 | .. | .. | .. | 1 | 1 | 4 | .. | 2 |
| Phthisis Pulmonalis | 33 | 6 | 31 | 5 | 1 | .. | 22 | 30 | 22 | 1 | 25 |
| Hæmoptysis (Tub.) | 5 | .. | 6 | .. | 1 | .. | 1 | .. | .. | .. | .. |
| Diabetes | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Purpura | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 |
| Anæmia | 6 | .. | 8 | .. | 1 | .. | 5 | 3 | 5 | .. | 6 |
| *II. Local Diseases.* | | | | | | | | | | | |
| 1. Of the Nervous System: | | | | | | | | | | | |
| Encephalitis | 1 | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Apoplexy | .. | .. | 2 | 2 | .. | .. | .. | .. | .. | .. | .. |
| Sunstroke | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Paralysis | 6 | .. | 7 | .. | 1 | .. | 2 | 1 | 3 | .. | 2 |
| Epilepsy | 4 | .. | 12 | .. | 3 | .. | 2 | 1 | 8 | 2 | 3 |
| Convulsions | .. | .. | .. | .. | 3 | .. | .. | .. | .. | .. | .. |
| Neuralgia | 15 | .. | 12 | .. | 2 | .. | 2 | 1 | .. | .. | .. |
| Hypochondriasis | 2 | .. | 2 | .. | .. | .. | 1 | .. | .. | .. | .. |

Abstract No. 10—*continued.*

| Stations | Gibraltar. | | Malta. | | Native Troops. R. Malta Fencibles. | | Gibraltar. | | Malta. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Strength | 4,397 | | 4,799 | | 568 | | Invalids. | | Invalids. | | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Sent Home. | Discharged at Netley. | Sent Home. | Discharged at Malta. | Discharged at Netley. |
| Stammering | .. | .. | 2 | .. | .. | .. | .. | .. | 2 | .. | 2 |
| Mania | 2 | .. | 1 | .. | 1 | .. | 1 | .. | 3 | 1 | .. |
| Dementia | 6 | .. | 1 | .. | .. | .. | .. | .. | 5 | . | .. |
| 2. Of the Eye: | | | | | | | | | | | |
| Conjunctivitis | 54 | .. | 92 | .. | 77 | .. | 4 | 3 | 4 | .. | 1 |
| Tarsal Ophthalmia | 7 | .. | 1 | .. | 4 | .. | .. | .. | .. | .. | 1 |
| Keratitis | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Sclerotitis | 1 | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Iritis | 2 | .. | 1 | .. | .. | .. | .. | 1 | .. | .. | 1 |
| Retinitis | 1 | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Amaurosis | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Impaired Vision | 3 | .. | .. | .. | .. | .. | 5 | 2 | 1 | 1 | .. |
| Short Sight | 2 | .. | .. | .. | .. | .. | 1 | 2 | 2 | .. | 2 |
| Hordeolum | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Trichiasis | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Hemeralopia | .. | .. | 3 | .. | .. | .. | .. | .. | .. | .. | .. |
| Pterygium | 1 | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Lachrymal Obstruction | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Opacity of Cornea | 2 | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Cataract | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. |
| 3. Of the Ear: | | | | | | | | | | | |
| Inflam. External Meatus | 4 | .. | 4 | .. | .. | .. | 2 | .. | .. | .. | .. |
| Inflam. Membr. Tympani | 10 | .. | 3 | .. | 1 | .. | .. | .. | .. | .. | .. |
| Deafness | 4 | .. | 2 | .. | .. | .. | .. | 1 | 1 | .. | 1 |
| Abscess | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Accumulation of Wax | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| 4. Of the Nose: | | | | | | | | | | | |
| Ozœna | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Epistaxis | .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Polypus Nasi | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| 5. Circulatory System: | | | | | | | | | | | |
| Pericarditis | 1 | .. | .. | .. | .. | .. | .. | .. | 2 | .. | .. |
| Valve Disease of Heart | 6 | .. | 8 | 1 | 1 | .. | 6 | 7 | 8 | 1 | 9 |
| Hypertrophy „ | 6 | .. | 6 | 2 | .. | .. | 4 | 5 | 4 | .. | 4 |
| Atrophy „ | .. | .. | .. | .. | .. | .. | .. | .. | 2 | .. | .. |
| Fatty Degeneration „ | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Palpitation | 35 | .. | 19 | .. | .. | .. | 15 | 12 | 6 | .. | 6 |
| Aneurism of Aorta | 3 | 2 | 1 | 2 | .. | .. | 1 | .. | .. | .. | 2 |
| Aneurism | 1 | .. | 3 | .. | .. | .. | .. | .. | 1 | .. | .. |
| Phlebitis | 1 | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| Varicose Veins | 3 | .. | 2 | .. | 1 | .. | .. | 3 | 1 | .. | 1 |
| Absorbent System: | | | | | | | | | | | |
| Inflam: of Glands | 20 | .. | 11 | .. | 1 | .. | .. | .. | 1 | .. | .. |
| Suppuration „ | 4 | .. | 4 | .. | .. | .. | .. | .. | .. | .. | .. |
| Goitre | .. | .. | 1 | .. | .. | .. | .. | .. | 1 | .. | 1 |

*Abstract No. 10—continued.*

| Stations | Gibraltar. | | Malta. | | Native Troops. R. Malta Fencibles. | | Gibraltar. | | Malta. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Strength | 4,397 | | 4,799 | | 568 | | Invalids. | | Invalids. | | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Sent Home. | Discharged at Netley. | Sent Home. | Discharged at Malta. | Discharged at Netley. |
| **8. Respiratory System:** | | | | | | | | | | | |
| Coryza | 6 | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Inflam: of Epiglottis | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Laryngitis | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Bronchitis | 158 | 1 | 188 | .. | 39 | .. | 12 | .. | 8 | 2 | 3 |
| Asthma | 2 | .. | 2 | .. | 1 | .. | 1 | 3 | 1 | .. | 2 |
| Pneumonia | 10 | 2 | 7 | 1 | 2 | .. | .. | .. | 1 | .. | 1 |
| Pulmonary Extravasation | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Pleurisy | 9 | 1 | 3 | .. | 2 | .. | 1 | 1 | .. | .. | 1 |
| **9. Digestive System:** | | | | | | | | | | | |
| Stomatitis | .. | .. | 5 | .. | .. | .. | .. | .. | .. | .. | .. |
| Ranula | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Abscess of Cheek | .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Gum Boil | 3 | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Tumour of Jaw | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Caries | 1 | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Tonsillitis | 102 | .. | 87 | 1 | 38 | .. | .. | .. | .. | .. | .. |
| Inflam: of Salivary Glands | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | 1 |
| Salivary Fistula | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 |
| Gastritis | .. | .. | 2 | .. | 2 | .. | .. | .. | .. | .. | .. |
| Hæmatemesis | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Dyspepsia | 132 | .. | 188 | .. | 47 | .. | 4 | .. | 3 | .. | 3 |
| Enteritis | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. | .. |
| Dysentery | 9 | .. | 6 | .. | .. | .. | 2 | 1 | 1 | .. | .. |
| Diarrhœa | 81 | .. | 108 | .. | 16 | .. | .. | .. | .. | .. | 1 |
| Hernia | 1 | .. | 2 | .. | .. | .. | .. | 2 | 5 | 1 | 4 |
| Colic | 15 | .. | 9 | .. | .. | .. | .. | .. | .. | .. | .. |
| Tænia Solium | 3 | .. | 22 | .. | 1 | .. | .. | .. | .. | .. | .. |
| Constipation | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Fistula in Ano | 3 | .. | 2 | .. | .. | .. | .. | 1 | .. | .. | .. |
| Hæmorrhoids | 18 | .. | 11 | .. | 1 | .. | .. | .. | .. | .. | .. |
| Tænia | .. | .. | 4 | .. | .. | .. | .. | .. | .. | .. | .. |
| Hepatitis | 17 | .. | 26 | 5 | .. | .. | 4 | 1 | 6 | .. | 2 |
| Cirrhosis | 1 | .. | .. | 1 | .. | .. | 1 | .. | .. | .. | .. |
| Jaundice | 9 | .. | 28 | 2 | 1 | .. | .. | 1 | .. | .. | .. |
| Splenitis | 1 | .. | 2 | .. | .. | .. | .. | .. | 1 | .. | .. |
| Simple Enlargem. of Liver | .. | .. | 7 | .. | .. | .. | .. | .. | .. | .. | .. |
| **10. Urinary System:** | | | | | | | | | | | |
| Bright's Disease | 5 | 2 | 4 | 1 | .. | .. | .. | 1 | 3 | .. | .. |
| Nephritis | .. | .. | .. | 1 | 1 | .. | 2 | .. | .. | .. | .. |
| Suppression of Urine | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Retention „ | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Incontinence „ | 3 | .. | 1 | .. | .. | .. | 1 | .. | 1 | .. | .. |
| Diuresis | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Irritability of Bladder | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |

Abstract No. 10—*continued.*

| Stations | Gibraltar. | | Malta. | | Native Troops. R. Malta Fencibles. | | Gibraltar. | | Malta. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Strength | 4,397 | | 4,799 | | 568 | | Invalids. | | Invalids. | | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Sent Home. | Discharged at Netley. | Sent Home. | Discharged at Malta. | Discharged at Netley. |
| Cystitis | .. | .. | 2 | .. | 4 | .. | .. | .. | .. | 1 | .. |
| Pyelitis | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| Gonorrhœa | 239 | .. | 129 | .. | 19 | .. | .. | .. | .. | .. | .. |
| Phimosis, &c. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Epididymitis | 11 | .. | 5 | .. | 3 | .. | .. | .. | .. | .. | .. |
| Bubo | 25 | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Stricture of Urethra | 7 | .. | 11 | .. | .. | .. | 1 | 1 | .. | .. | .. |
| 11. Generative System: | | | | | | | | | | | |
| Abscess of Scrotum | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Varicocele | 1 | .. | 3 | .. | .. | .. | .. | .. | .. | .. | .. |
| Hydrocele | 7 | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Orchitis | 63 | .. | 65 | .. | 5 | .. | .. | .. | 1 | .. | 1 |
| Spermatorrhœa | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Retraction of Testicle | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Protrusion of Tubuli | .. | .. | 1 | .. | .. | .. | .. | .. | 1 | .. | .. |
| 12. Organs of Locomotion: | | | | | | | | | | | |
| Ostitis | 7 | .. | 6 | .. | 1 | .. | 1 | .. | .. | 1 | 1 |
| Caries | 1 | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| Necrosis | .. | .. | 1 | .. | .. | .. | .. | .. | 2 | .. | 1 |
| Synovitis | 9 | .. | 7 | .. | .. | .. | 2 | 1 | 1 | .. | 1 |
| Lumbar Abscess | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 |
| Muscular Atrophy | .. | .. | 4 | .. | .. | .. | .. | .. | .. | .. | .. |
| Enlarged Bursa Patellæ | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Contraction | .. | .. | 1 | .. | 1 | .. | .. | .. | 1 | .. | 1 |
| Bunion | 1 | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| Ganglion | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| 13. Of Cellular Tissue: | | | | | | | | | | | |
| Inflam. of Cellular Tissue | 2 | .. | 47 | .. | .. | .. | .. | .. | .. | .. | .. |
| Abscess „ „ | 43 | .. | 87 | .. | 19 | .. | .. | .. | 1 | .. | .. |
| Tumour | .. | .. | 1 | .. | 1 | .. | .. | .. | .. | .. | .. |
| 14. Cutaneous System: | | | | | | | | | | | |
| Urticaria | 5 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Lichen | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Psoriasis | 12 | .. | 4 | .. | .. | .. | .. | .. | .. | .. | .. |
| Herpes | 8 | .. | 8 | .. | .. | .. | .. | .. | .. | .. | 1 |
| Eczema | 20 | .. | 22 | .. | .. | .. | .. | .. | 1 | .. | 1 |
| Impetigo | 3 | .. | 3 | .. | .. | .. | .. | .. | .. | .. | .. |
| Ringworm | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Tinea | 5 | .. | 5 | .. | .. | .. | .. | .. | .. | .. | .. |
| Corns | 1 | .. | 1 | .. | .. | .. | 1 | .. | .. | .. | .. |
| Erythema | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Pemphigus | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Rupia | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Acne | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Sycosis | .. | .. | 2 | .. | 2 | .. | .. | .. | .. | .. | .. |
| Prurigo | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |

Abstract No. 10—*continued.*

| Stations .. .. .. | Gibraltar. | | Malta. | | Native Troops. R. Malta Fencibles. | | Gibraltar. | | Malta. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Strength .. .. .. | 4,397 | | 4,799 | | 568 | | Invalids. | | Invalids. | | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Sent Home. | Discharged at Netley. | Sent Home. | Discharged at Malta. | Discharged at Netley. |
| Porrigo .. .. .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Ulcer .. .. .. | 97 | .. | 88 | .. | 23 | .. | 5 | 3 | 8 | .. | 1 |
| Boil .. .. .. | 173 | .. | 132 | .. | 35 | .. | 1 | .. | .. | .. | .. |
| Carbuncle .. .. .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Whitlow .. .. .. | 9 | .. | 17 | .. | 3 | .. | .. | .. | .. | .. | .. |
| Itch .. .. .. .. | 7 | .. | 5 | .. | 2 | .. | .. | .. | .. | .. | .. |
| Warts .. .. .. | 16 | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Ingrown Nail .. .. | 1 | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Tumour .. .. .. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Irritation by Fishbite .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| III. *Conditions, &c.* | | | | | | | | | | | |
| General Debility .. .. | 31 | .. | 26 | .. | 3 | .. | 12 | 3 | 10 | .. | 4 |
| IV. *Poisons.* | | | | | | | | | | | |
| Delirium Tremens .. .. | 16 | 2 | 15 | 1 | 1 | .. | .. | .. | .. | .. | .. |
| Alcohol .. .. .. | 24 | .. | 16 | .. | 1 | .. | .. | .. | .. | .. | .. |
| V. *Injuries.* | | | | | | | | | | | |
| 2. Accidental: | | | | | | | | | | | |
| Burns and Scalds .. .. | 4 | .. | 8 | .. | .. | .. | .. | .. | .. | .. | .. |
| Asphyxia by Drowning .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Contusion .. .. .. | 153 | .. | 210 | .. | 9 | .. | 1 | 1 | .. | .. | .. |
| Concussion of the Brain .. | 2 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Fracture .. .. .. | 13 | .. | 25 | 2 | 1 | .. | 2 | 1 | 2 | 1 | 3 |
| Wounds .. .. .. | 80 | .. | 93 | .. | 20 | .. | .. | .. | 1 | .. | .. |
| Sprain .. .. .. | 71 | .. | 118 | .. | 3 | .. | .. | .. | .. | .. | .. |
| Dislocation .. .. .. | 1 | .. | 3 | .. | .. | .. | .. | .. | 1 | .. | 1 |
| Blisters of the Feet .. | 6 | .. | 3 | .. | .. | .. | .. | .. | .. | .. | .. |
| Foreign Body in Throat .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 3. Homicidal: | | | | | | | | | | | |
| Wounds .. .. .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| 4. Self-inflicted: | | | | | | | | | | | |
| Gunshot .. .. .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Cut-throat .. .. .. | 1 | 2 | 1 | .. | 1 | .. | .. | .. | .. | .. | .. |
| Concussion of Brain .. | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. |
| Hanging .. .. .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Multiple Injury .. .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Drowning .. .. .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| VI. *Surgical Operations.* | | | | | | | | | | | |
| Amputation of Great Toe .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| „ Finger .. | 1 | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| No appreciable Disease .. | 1 | .. | 12 | .. | .. | .. | .. | .. | .. | .. | .. |
| Total .. .. .. | 2,957 | 27 | 3,165 | 40 | 474 | 2 | 166 | 110 | 172 | 14 | 117 |

Abstract No. 10—*continued.*

CAUSES of the Deaths among the Invalids.

| | From Gibraltar. | From Malta. |
|---|---|---|
| Phthisis Pulmonalis .. .. .. | 2 | 2 |
| Scrofula .. .. .. .. | 1 | 1 |
| Scirrhus .. .. .. .. | .. | 1 |
| Paralysis .. .. .. .. | .. | 2 |
| Valve Disease of Heart .. .. | 1 | 1 |
| Aneurism .. .. .. .. | .. | 1 |
| Lumbar Abscess .. .. .. | 1 | .. |
| Total .. .. .. .. | 5 | 8 |

APPENDIX No. XXI—*continued.*

ABSTRACT No. 11, showing the Ages of the Troops serving in the Mediterranean, and the Deaths at each Age, during the Year 1870.

| Station. | Corps. | Under 20 Years. | | 20 and under 25. | | 25 and under 30. | | 30 and under 35. | | 35 and under 40. | | 40 and upwards. | | Total. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Strength on 1st January. | Died. | Strength on 1st January. | Died. | Strength on 1st January. | Died. | Strength on 1st January. | Died. | Strength on 1st January. | Died. | Strength on 1st January. | Died. | Strength on 1st January. | Died. |
| Gibraltar | Royal Artillery .. .. .. | 56 | .. | 185 | 2 | 215 | 1 | 194 | 2 | 85 | 1 | 13 | .. | 748 | 6 |
| | 1st Battalion 13th Foot .. .. | 104 | .. | 276 | .. | 145 | 3 | 112 | 1 | 29 | 1 | 1 | .. | 667 | 5 |
| | 28th Foot .. .. .. .. | 103 | .. | 250 | .. | 130 | .. | 158 | 1 | 87 | .. | 12 | .. | 740 | 1 |
| | 71st „ .. .. .. .. | 127 | .. | 243 | .. | 136 | 2 | 106 | 2 | 54 | 1 | 2 | .. | 668 | 5 |
| | 74th „ .. .. .. .. | 71 | .. | 327 | 1 | 167 | 2 | 69 | 1 | 38 | .. | 7 | 1 | 679 | 5 |
| Malta .. | Royal Artillery .. .. .. | 12 | .. | 200 | 2 | 170 | .. | 194 | 5 | 80 | 1 | 17 | 1 | 673 | 9 |
| | 1st Battalion 24th Foot .. .. | 89 | .. | 289 | .. | 117 | 2 | 72 | 1 | 30 | 1 | 5 | .. | 602 | 4 |
| | 31st Foot .. .. .. .. | 29 | .. | 257 | 2 | 162 | 1 | 158 | 1 | 62 | 5 | 7 | 2 | 675 | 11 |
| | 48th „ .. .. .. .. | 110 | 1 | 300 | 1 | 163 | 5 | 94 | .. | 39 | .. | 2 | .. | 708 | 7 |
| | 52nd „ .. .. .. .. | 29 | .. | 396 | 4 | 106 | .. | 117 | .. | 54 | 2 | 2 | .. | 704 | 6 |
| | 64th „ .. .. .. .. | 13 | .. | 207 | 1 | 179 | 1 | 112 | 3 | 69 | 1 | 14 | 1 | 594 | 7 |
| | 87th „ .. .. .. .. | 25 | .. | 187 | .. | 148 | .. | 115 | 1 | 120 | 2 | 33 | .. | 628 | 3 |
| | Total .. .. .. | 768 | 1 | 3,117 | 13 | 1,838 | 17 | 1,501 | 18 | 747 | 15 | 115 | 5 | 8,086 | 69 |

APPENDIX No. XXI—*continued.*

ABSTRACT No. 12, showing the Admissions into Hospital and Deaths among the Troops serving in the Dominion of Canada and in Bermuda during the Year 1870; and the Number of Invalids sent home from these Colonies, and of Men finally discharged the Service in them and at Netley during the same period.

| Stations .. .. .. | Dominion of Canada. | | Bermuda. | | Invalids. | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Average Annual Strength | 4,519 | | 1,908 | | Sent home from— | | Discharged in Canada. | Discharged at Netley from— | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Canada. | Bermuda. | | Canada. | Bermuda. |
| I. *General Diseases.* | | | | | | | | | |
| 1. Febrile: | | | | | | | | | |
| Measles .. .. .. | 4 | .. | .. | .. | .. | .. | .. | .. | .. |
| Scarlet Fever .. .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Enteric „ .. .. | 3 | .. | 21 | 4 | 1 | .. | .. | .. | .. |
| Simple Continued Fever.. | 32 | .. | 43 | 1 | .. | .. | .. | .. | .. |
| Febricula .. .. .. | 63 | .. | 140 | .. | .. | .. | .. | .. | .. |
| Ague .. .. .. | 18 | .. | .. | .. | .. | .. | .. | .. | .. |
| Remittent Fever .. .. | 7 | .. | .. | .. | .. | .. | .. | .. | .. |
| Influenza .. .. .. | 27 | .. | 10 | .. | .. | .. | .. | .. | .. |
| Erysipelas.. .. .. | 11 | 1 | 1 | .. | .. | .. | .. | .. | .. |
| Mumps .. .. .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| 2. Constitutional: | | | | | | | | | |
| Acute Rheumatism .. | 64 | .. | 21 | .. | .. | .. | .. | .. | .. |
| Chronic „ .. | 56 | .. | 35 | .. | 11 | 3 | .. | 3 | 1 |
| Muscular „ .. | 20 | .. | 9 | .. | .. | .. | .. | .. | .. |
| Primary Syphilis .. .. | 247 | .. | 66 | .. | .. | .. | .. | .. | .. |
| Secondary „ .. .. | 89 | .. | 13 | .. | 7 | .. | 2 | 4 | 1 |
| Scrofula .. .. .. | 15 | .. | 1 | .. | 4 | .. | .. | 1 | .. |
| Phthisis Pulmonalis .. | 16 | 5 | 18 | 2 | 14 | 5 | .. | 18 | 2 |
| Hæmoptysis (Tub.) .. | 2 | .. | 2 | 1 | .. | .. | .. | .. | .. |
| Purpura .. .. .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Scurvy .. .. .. | 4 | .. | .. | .. | .. | .. | .. | .. | .. |
| General Dropsy .. .. | 4 | 1 | .. | .. | 1 | .. | .. | .. | .. |
| Gout .. .. .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Synovial Rheumatism .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Gonorrhœal „ .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Tumour .. .. .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Gelatinous Cyst .. .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Chronic Osteo-Arthritis .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| II. *Local Diseases.* | | | | | | | | | |
| 1. Nervous System: | | | | | | | | | |
| Encephalitis .. .. | 1 | .. | 1 | .. | .. | .. | .. | .. | .. |
| Meningitis .. .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Apoplexy .. .. .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Paralysis .. .. .. | 10 | 2 | .. | .. | 3 | .. | .. | 1 | .. |
| Epilepsy .. .. .. | 10 | 1 | 3 | .. | 3 | 2 | .. | 1 | .. |
| Neuralgia .. .. .. | 11 | .. | 6 | .. | 1 | .. | 1 | .. | .. |
| Mania .. .. .. | 5 | .. | 3 | .. | 2 | 1 | .. | .. | .. |
| Dementia .. .. .. | 2 | .. | 1 | .. | 4 | 2 | .. | .. | .. |

Abstract No. 12—*continued.*

| Stations | Dominion of Canada. | | Bermuda. | | Invalids. | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Average Annual Strength | 4,519 | | 1,908 | | Sent home from— | | Discharged in Canada. | Discharged at Netley from— | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Canada. | Bermuda. | | Canada. | Bermuda. |
| Sunstroke | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Convulsions | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Spasm of Muscle | .. | .. | 2 | .. | .. | .. | .. | .. | .. |
| Pterygium | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| 2. Diseases of the Eye: | | | | | | | | | |
| Conjunctivitis | 46 | .. | 36 | .. | .. | .. | .. | .. | .. |
| Tarsal Ophthalmia | 31 | .. | 10 | .. | .. | 5 | .. | .. | .. |
| Impaired Vision | 1 | .. | 1 | .. | 3 | 1 | .. | 1 | 1 |
| Amaurosis | 2 | .. | 3 | .. | 1 | 1 | .. | .. | .. |
| Staphyloma | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| Iritis | 5 | .. | .. | .. | 1 | .. | .. | 1 | .. |
| Hemeralopia | .. | .. | 3 | .. | .. | 1 | .. | .. | .. |
| Nyctalopia | .. | .. | .. | .. | .. | .. | .. | .. | 1 |
| Sclerotitis | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Ulcer of Cornea | 2 | .. | 1 | .. | .. | .. | .. | 1 | 1 |
| Opacity „ | .. | .. | .. | .. | .. | .. | .. | .. | 1 |
| Keratitis | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Cataract | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| 3. Diseases of the Ear: | | | | | | | | | |
| Inflam. Membr. Tympani | 5 | .. | 3 | .. | .. | .. | .. | .. | .. |
| Deafness | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Sebaceous Tumour | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Inflam. Extl. Meatus | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| 4. Diseases of the Nose: | | | | | | | | | |
| Epistaxis | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Polypus | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| 5. Circulatory System: | | | | | | | | | |
| Pericarditis | 5 | 1 | .. | .. | .. | .. | .. | .. | .. |
| Valve Disease of Heart | 7 | 3 | 4 | 1 | 5 | 1 | 4 | 2 | 1 |
| Hypertrophy „ | 1 | .. | 1 | .. | 1 | 1 | .. | .. | 1 |
| Palpitation „ | 3 | .. | 3 | .. | 1 | 2 | .. | .. | 1 |
| Aneurism of Aorta | 3 | 1 | 1 | .. | .. | .. | .. | .. | .. |
| Aneurism | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Varicose Veins | 2 | .. | 3 | .. | 1 | 1 | 2 | .. | 1 |
| Dilatation of Aorta | 1 | .. | .. | .. | 1 | .. | .. | .. | .. |
| Rupture of Vein | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Fatty Heart | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| 6. Absorbent System: | | | | | | | | | |
| Inflam. of Glands | 74 | .. | 33 | .. | .. | .. | .. | .. | .. |
| Suppuration „ | 30 | .. | .. | .. | .. | .. | .. | .. | .. |
| Abscess of „ | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| 8. Respiratory System: | | | | | | | | | |
| Laryngitis | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Bronchitis | 222 | 2 | 90 | .. | 9 | 2 | 1 | 2 | .. |

Abstract No. 12—*continued.*

| Stations | Dominion of Canada. | | Bermuda. | | Invalids. | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Average Annual Strength | 4,519 | | 1,908 | | Sent home from— | | Discharged in Canada. | Discharged at Netley from— | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Canada. | Bermuda. | | Canada. | Bermuda. |
| Asthma | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Pneumonia | 29 | 2 | 8 | .. | 2 | .. | .. | 1 | .. |
| Pleurisy | 15 | .. | 3 | .. | 1 | .. | 1 | .. | .. |
| Abscess of Lung | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| 9. Digestive System: | | | | | | | | | |
| Tonsillitis | 104 | .. | 16 | .. | .. | .. | .. | .. | .. |
| Dyspepsia | 108 | .. | 124 | .. | .. | .. | .. | .. | .. |
| Enteritis | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Dysentery | 2 | .. | 51 | 1 | .. | .. | .. | .. | .. |
| Diarrhœa | 65 | 1 | 57 | .. | .. | .. | 1 | .. | .. |
| Hernia | 9 | 1 | .. | .. | 3 | 1 | 2 | 1 | .. |
| Colic | 17 | .. | 18 | .. | .. | .. | .. | .. | .. |
| Tænia Solium | 1 | .. | 3 | .. | .. | .. | .. | .. | .. |
| Constipation | 6 | .. | 4 | .. | .. | .. | .. | .. | .. |
| Fistula in Ano | 6 | .. | 1 | .. | 1 | .. | .. | 1 | .. |
| Hæmorrhoids | 28 | .. | 17 | .. | .. | .. | .. | .. | .. |
| Hepatitis | 10 | .. | 8 | .. | .. | 1 | .. | .. | .. |
| Jaundice | 10 | .. | 1 | .. | .. | .. | .. | .. | .. |
| Peritonitis | 1 | 1 | .. | .. | .. | .. | .. | .. | .. |
| Internal Strangulation | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Ulcer of Lip | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Gum Boil | 10 | .. | 1 | .. | .. | .. | .. | .. | .. |
| Stomatitis | 3 | .. | .. | .. | .. | .. | .. | .. | .. |
| Alveolar Abscess | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Hæmatemesis | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Intestinal Hæmorrhage | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Ulcer of Anus | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Fissure of Anus | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Condyloma of Anus | 3 | .. | .. | .. | .. | .. | .. | .. | .. |
| Congestion of Liver | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Abscess of Rectum | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| 10. Urinary System: | | | | | | | | | |
| Sloughing of Scrotum | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Bright's Disease | 1 | .. | 1 | .. | .. | .. | .. | 1 | .. |
| Nephritis | 2 | .. | .. | .. | 1 | .. | .. | .. | .. |
| Gonorrhœa | 363 | .. | 46 | .. | .. | .. | .. | .. | .. |
| Phymosis, &c. | 8 | .. | 4 | .. | .. | .. | .. | .. | .. |
| Bubo | 6 | .. | 1 | .. | .. | .. | .. | .. | .. |
| Epididymitis Gon. | 15 | .. | 5 | .. | .. | .. | .. | .. | .. |
| Stricture of Urethra | 7 | .. | 2 | .. | .. | .. | .. | .. | .. |
| Urinary Fistula | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| Warts | 5 | .. | 2 | .. | .. | .. | .. | .. | .. |
| Diuresis | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Suppression of Urine | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Hæmaturia | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Abscess of Penis | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Irritable Bladder | 1 | .. | .. | .. | .. | .. | .. | .. | .. |

Abstract No. 12—*continued.*

| Stations | Dominion of Canada. | | Bermuda. | | Invalids. | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Average Annual Strength | 4,519 | | 1,908 | | Sent home from— | | Discharged in Canada. | Discharged at Netley from— | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Canada. | Bermuda. | | Canada. | Bermuda. |
| Prostatic Abscess | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Renal Calculus | .. | .. | 1 | 1 | .. | .. | .. | .. | .. |
| 11. Generative System : | | | | | | | | | |
| Varicocele | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Hydrocele | 2 | .. | .. | .. | 1 | .. | 1 | 1 | .. |
| Orchitis | 38 | .. | 11 | .. | 1 | 1 | .. | .. | 1 |
| 12. Organs of Locomotion: | | | | | | | | | |
| Ostitis | 5 | .. | 1 | .. | 1 | .. | .. | .. | .. |
| Caries | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Necrosis | 2 | .. | .. | .. | 1 | .. | .. | .. | .. |
| Synovitis | 7 | .. | 5 | .. | .. | .. | .. | .. | .. |
| Dropsy of Joint | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Enlargement of Bursa | 1 | .. | .. | .. | 1 | .. | .. | 1 | .. |
| Bursal Abscess | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Inflammation of Joint | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Atrophy of Muscle | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Contraction | .. | .. | .. | .. | 1 | .. | .. | 2 | .. |
| 13. Diseases of Cellular Tissue : | | | | | | | | | |
| Inflam : of Cellular Tissue | 11 | .. | 12 | .. | .. | .. | .. | .. | .. |
| Abscess „ „ | 80 | .. | 15 | .. | 3 | .. | .. | 2 | .. |
| 14. Cutaneous System : | | | | | | | | | |
| Urticaria | 1 | .. | 1 | .. | .. | .. | .. | .. | .. |
| Lichen | 1 | .. | 1 | .. | .. | .. | .. | .. | .. |
| Psoriasis | 4 | .. | 1 | .. | .. | 1 | .. | .. | .. |
| Herpes | 11 | .. | 2 | .. | .. | .. | .. | .. | .. |
| Eczema | 32 | .. | 11 | .. | .. | .. | .. | .. | .. |
| Ulcer | 99 | .. | 67 | .. | 3 | 1 | 1 | 2 | 1 |
| Boil | 34 | .. | 44 | .. | .. | .. | .. | .. | .. |
| Carbuncle | 3 | .. | .. | .. | .. | .. | .. | .. | .. |
| Whitlow | 16 | .. | 9 | .. | .. | .. | .. | .. | .. |
| Itch | 5 | .. | 1 | .. | .. | .. | .. | .. | .. |
| Warts | 5 | .. | 2 | .. | .. | .. | .. | .. | .. |
| Erythema | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Rupia | 2 | .. | 1 | .. | .. | .. | .. | .. | .. |
| Acne | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Ecthyma | 4 | .. | .. | .. | .. | .. | .. | .. | .. |
| Frost Bite | 12 | .. | .. | .. | .. | .. | .. | .. | .. |
| Ringworm | 3 | .. | 11 | .. | .. | .. | .. | .. | .. |
| Tinea | 4 | .. | 2 | .. | .. | .. | .. | .. | .. |
| Ingrown Toenail | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Melasma | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Chigoe | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Lepra | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Corns | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Mentagra | 2 | .. | .. | .. | 1 | .. | .. | .. | .. |

Abstract No. 12—*continued.*

| Stations | Dominion of Canada. | | Bermuda. | | Invalids. | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sent home from— | | | Discharged at Netley from— | |
| Average Annual Strength | 4,519 | | 1,908 | | | | Discharged in Canada. | | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Canada. | Bermuda. | | Canada. | Bermuda. |
| III. *Conditions, &c.* | | | | | | | | | |
| General Debility | 13 | .. | 26 | .. | 7 | 5 | .. | 2 | .. |
| IV. *Poisons.* | | | | | | | | | |
| Delirium Tremens | 54 | 2 | 25 | .. | .. | .. | .. | .. | .. |
| Alcohol | 9 | .. | 1 | 3 | .. | .. | .. | .. | .. |
| V. *Injuries.* | | | | | | | | | |
| 2. Accidental: | | | | | | | | | |
| Burns and Scalds | 31 | .. | 5 | .. | .. | .. | .. | .. | .. |
| Multiple Injury | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Asphyxia by Drowning | .. | 6 | .. | 4 | .. | .. | .. | .. | .. |
| Contusion | 187 | .. | 108 | .. | .. | .. | .. | .. | .. |
| Concussion of the Brain | 2 | .. | .. | .. | 1 | .. | .. | 1 | .. |
| Fracture | 18 | .. | 10 | 1 | 1 | .. | .. | 2 | .. |
| Wounds | 81 | .. | 41 | .. | .. | .. | .. | .. | .. |
| „ from Gunshot | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Sprain | 105 | .. | 33 | .. | 1 | .. | .. | .. | .. |
| Dislocation | 4 | .. | 1 | .. | .. | .. | .. | .. | .. |
| Blisters of the Feet | 15 | .. | 5 | .. | .. | .. | .. | .. | .. |
| Asphyxia | .. | 1 | .. | 1 | .. | .. | .. | .. | .. |
| 3. Homicidal: | | | | | | | | | |
| Wound | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| 4. Self-inflicted: | | | | | | | | | |
| Cut throat | 1 | 2 | .. | .. | .. | .. | .. | .. | .. |
| Gunshot | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Drowning | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Poison | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| VI. *Surgical Operations.* | | | | | | | | | |
| Amputation of Thigh | .. | .. | 1 | .. | .. | 1 | .. | .. | .. |
| No appreciable Disease | 8 | .. | .. | .. | .. | .. | .. | .. | .. |
| Total | 2,971 | 36 | 1,416 | 23 | 108 | 39 | 16 | 54 | 14 |

CAUSES of the Deaths of the Invalids.

| Diseases. | Dominion of Canada. | Bermuda. |
|---|---|---|
| Phthisis Pulmonalis | 2 | .. |
| Empyema | 1 | .. |
| Total | 3 | .. |

APPENDIX No. XXI—*continued.*

ABSTRACT No. 13, showing the Ages of the Troops serving in the Dominion of Canada, and the Deaths at each Age, during the Year 1870.

| Corps. | Under 20. | | 20 and under 25. | | 25 and under 30. | | 30 and under 35. | | 35 and under 40. | | 40 and upwards. | | Total. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Strength on 1st January. | Died. | Strength on 1st January. | Died. | Strength on 1st January. | Died. | Strength on 1st January. | Died. | Strength on 1st January. | Died. | Strength on 1st January. | Died. | Strength on 1st January. | Died. |
| 1st Battalion 60th Foot | 57 | .. | 246 | 2 | 240 | .. | 84 | 3 | 37 | 1 | .. | .. | 664 | 6 |
| 78th Foot .. .. .. | 46 | .. | 217 | 2 | 307 | .. | 82 | .. | 33 | .. | 5 | .. | 690 | 2 |
| 84th „ .. .. .. | 131 | .. | 186 | 1 | 230 | 1 | 110 | 1 | 21 | .. | 1 | .. | 679 | 3 |
| Total .. .. .. | 234 | .. | 649 | 5 | 777 | 1 | 276 | 4 | 91 | 1 | 6 | .. | 2,033 | 11 |

APPENDIX No. XXI—*continued.*

ABSTRACT No. 14, showing the Admissions into Hospital and Deaths among the White Troops serving in the Windward and Leeward Command and Jamaica, in the Year 1870; the disabilities of the Invalids sent home, and of those Discharged the Service at Netley during the same period.

| Stations .. .. .. | Windward and Leeward Command. | | Jamaica. | | Invalids. | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Sent Home from | | Discharged at Netley from— | |
| Strength .. .. .. | 769 | | 663 | | | | | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | West Indies. | Jamaica. | West Indies. | Jamaica. |
| I. *General Diseases.* | | | | | | | | |
| 1. Febrile: | | | | | | | | |
| Simple Continued Fever .. | 201 | 3 | 65 | .. | .. | .. | .. | .. |
| Febricula .. .. .. | 1 | .. | 2 | .. | .. | .. | .. | .. |
| Yellow Fever .. .. | 2 | 2 | 1 | .. | .. | .. | .. | .. |
| Ague .. .. .. | 4 | .. | 7 | .. | .. | 2 | .. | .. |
| Remittent Fever .. .. | 2 | .. | 6 | .. | .. | .. | .. | .. |
| Mumps .. .. .. | .. | .. | 2 | .. | .. | .. | .. | .. |
| Influenza .. .. .. | 4 | .. | .. | .. | .. | .. | .. | .. |
| rysipelas .. .. .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| 2. Constitutional: | | | | | | | | |
| Acute Rheumatism .. | 2 | .. | 4 | .. | .. | .. | .. | .. |
| Chronic „ .. | 7 | .. | 2 | .. | .. | .. | .. | .. |
| Muscular „ .. | 8 | .. | .. | .. | .. | .. | .. | .. |
| Primary Syphilis .. .. | 49 | .. | 16 | .. | .. | .. | .. | .. |
| Secondary „ .. .. | 3 | .. | 11 | .. | 1 | 1 | 1 | 1 |
| Phthisis Pulmonalis .. | 3 | 2 | 4 | 1 | 1 | .. | 4 | 3 |
| Hæmoptysis (Tub.) .. .. | .. | .. | 3 | .. | .. | 1 | .. | .. |
| Anæmia .. .. .. | 1 | .. | 1 | .. | .. | .. | .. | .. |
| General Dropsy .. .. | 2 | .. | 2 | .. | .. | .. | .. | .. |
| II. *Local Diseases.* | | | | | | | | |
| 1. Of the Nervous Sys.: | | | | | | | | |
| Neuralgia .. .. .. | 2 | .. | .. | .. | .. | .. | .. | .. |
| Dementia .. .. .. | 4 | .. | 1 | .. | 1 | .. | .. | .. |
| 2. Of the Eye: | | | | | | | | |
| Conjunctivitis .. .. | 3 | .. | 5 | .. | .. | 1 | .. | 1 |
| Sclerotitis .. .. .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| 3. Of the Ear: | | | | | | | | |
| Inflam. Membr. Tympani .. | 1 | .. | 1 | .. | .. | .. | .. | .. |
| „ Ext. Meatus .. | 2 | .. | 1 | .. | .. | .. | .. | .. |
| 5. Circulatory System: | | | | | | | | |
| Valve Disease of Heart .. | 3 | 2 | .. | .. | .. | .. | .. | .. |
| Hypertrophy „ .. | .. | .. | .. | .. | .. | 1 | .. | 1 |
| Palpitation .. .. .. | 2 | .. | 1 | .. | .. | .. | .. | .. |
| Syncope .. .. .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Aneurism of Aorta .. .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Varicose Veins .. .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| 6. Absorbent System: | | | | | | | | |
| Inflammation of Glands .. | 18 | .. | 10 | .. | .. | .. | .. | .. |
| Suppuration „ .. | 1 | .. | 1 | .. | .. | .. | .. | .. |

Abstract No. 14—*continued.*

| Stations | Windward and Leeward Command. | | Jamaica. | | Invalids. | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Sent Home from | | Discharged at Netley from— | |
| Strength | 769 | | 663 | | | | | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | West Indies. | Jamaica. | West Indies. | Jamaica. |
| 8. Respiratory System: | | | | | | | | |
| Laryngitis | 1 | .. | .. | .. | .. | .. | .. | .. |
| Bronchitis | 88 | .. | 6 | .. | 6 | 2 | .. | .. |
| Asthma | 3 | .. | .. | .. | .. | .. | .. | .. |
| Emphysema | .. | .. | 1 | .. | .. | .. | .. | .. |
| Pneumonia | 1 | .. | .. | .. | .. | .. | .. | .. |
| Pulmonary Extravasation | .. | .. | 1 | .. | .. | .. | .. | .. |
| Pleurisy | 1 | .. | .. | .. | .. | .. | .. | .. |
| 9. Digestive System: | | | | | | | | |
| Inflammation of Gums | .. | .. | 1 | .. | .. | .. | .. | .. |
| Tonsillitis | 5 | .. | 2 | .. | .. | .. | .. | .. |
| Gastritis | .. | .. | 1 | .. | .. | .. | .. | .. |
| Dyspepsia | 12 | .. | 10 | .. | .. | .. | .. | .. |
| Enteritis | .. | .. | 1 | .. | .. | .. | .. | .. |
| Dysentery | 4 | .. | 4 | .. | .. | 1 | .. | .. |
| Diarrhœa | 22 | .. | 15 | .. | .. | .. | .. | .. |
| Hernia | 1 | .. | .. | .. | 1 | .. | .. | .. |
| Colic | 6 | .. | .. | .. | .. | .. | .. | .. |
| Constipation | 7 | .. | .. | .. | .. | .. | .. | .. |
| Hæmorrhoids | 7 | .. | 2 | .. | .. | .. | .. | .. |
| Condyloma of Anus | .. | .. | 1 | .. | .. | .. | .. | .. |
| Hepatitis | 1 | .. | 1 | .. | .. | .. | .. | .. |
| Passage of Gall Stones | .. | .. | 1 | .. | .. | .. | .. | .. |
| 10. Urinary System: | | | | | | | | |
| Bright's Disease | 2 | .. | .. | .. | 1 | .. | 1 | .. |
| Nephritis | 2 | .. | .. | .. | .. | .. | .. | .. |
| Gonorrhœa | 51 | .. | 40 | .. | .. | .. | .. | .. |
| Phimosis, &c. | 1 | .. | 2 | .. | .. | .. | .. | .. |
| Bubo | 8 | .. | 1 | .. | .. | .. | .. | .. |
| Epididymitis Gon. | 3 | .. | 2 | .. | .. | .. | .. | .. |
| 11. Generative System: | | | | | | | | |
| Vericocele | 2 | .. | .. | .. | .. | .. | .. | .. |
| Hydrocele | .. | .. | 2 | .. | .. | .. | .. | .. |
| Hæmatocele | .. | .. | 1 | .. | .. | .. | .. | .. |
| Orchitis | 2 | .. | 5 | .. | .. | .. | .. | .. |
| 12. Organs of Locomotion: | | | | | | | | |
| Ostitis | .. | .. | 1 | .. | .. | .. | .. | .. |
| Caries | .. | .. | 1 | .. | .. | .. | .. | .. |
| Synovitis | 2 | .. | 4 | .. | .. | .. | .. | .. |
| Loose Cartilage | .. | .. | 1 | .. | .. | .. | .. | .. |
| Adhesion of Tendons | .. | .. | 1 | .. | .. | .. | .. | .. |
| 13. Of Cellular Tissue: | | | | | | | | |
| Inflam. of Cellular Tissue | 2 | .. | .. | .. | .. | .. | .. | .. |
| Abscess " " | 36 | .. | 2 | .. | .. | .. | .. | .. |
| Cystic Tumour | .. | .. | 1 | .. | .. | .. | .. | .. |

Abstract No. 14—*continued.*

| Stations .. .. .. | Windward and Leeward Command. | | Jamaica. | | Invalids. | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Sent Home from | | Discharged at Netley from— | |
| Strength .. .. .. | 769 | | 663 | | | | | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | West Indies. | Jamaica. | West Indies. | Jamaica. |
| 14. Cutaneous System: | | | | | | | | |
| Lichen .. .. .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Psoriasis .. .. .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Herpes .. .. .. | 1 | .. | 2 | .. | .. | .. | .. | .. |
| Eczema .. .. .. | 28 | .. | 1 | .. | .. | .. | .. | .. |
| Impetigo .. .. .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Sycosis .. .. .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Rupia .. .. .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Ulcer .. .. .. | 34 | .. | 11 | .. | 1 | .. | .. | .. |
| Boil.. .. .. .. | 18 | .. | 13 | .. | .. | .. | .. | .. |
| Carbuncle .. .. .. | .. | .. | 5 | .. | .. | .. | .. | .. |
| Whitlow .. .. .. | 1 | .. | 4 | .. | .. | .. | .. | .. |
| Itch .. .. .. .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Warts .. .. .. | 3 | .. | 1 | .. | .. | .. | .. | .. |
| Ingrown Nails .. .. | 1 | .. | 1 | .. | .. | .. | .. | .. |
| Tinea .. .. .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Chigoe .. .. .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| III. *Conditions, &c.* | | | | | | | | |
| General Debility .. .. | 2 | .. | 10 | .. | 1 | 1 | .. | .. |
| IV. *Poisons.* | | | | | | | | |
| Delirium Tremens .. .. | 8 | .. | 15 | .. | .. | .. | .. | .. |
| Alcohol .. .. .. | 6 | .. | .. | .. | .. | .. | .. | .. |
| V. *Injuries.* | | | | | | | | |
| 2. Accidental: | | | | | | | | |
| Burns and Scalds .. .. | 2 | .. | .. | .. | .. | .. | .. | .. |
| Contusion .. .. .. | 27 | .. | 29 | .. | .. | .. | .. | .. |
| Fracture .. .. .. | 4 | .. | 3 | .. | 1 | .. | 1 | .. |
| Wounds .. .. .. | 15 | .. | 9 | .. | .. | .. | .. | .. |
| Sprain .. .. .. | 10 | .. | 12 | .. | .. | .. | .. | .. |
| Blisters of the Feet .. | 1 | .. | 1 | .. | .. | .. | .. | .. |
| Total .. .. | 712 | 9 | 331 | 1 | 14 | 10 | 7 | 6 |

CAUSES of Deaths of the Invalids.

| | Jamaica. | Windward and Leeward Command. |
|---|---|---|
| Phthisis Pulmonalis .. .. | .. | 1 |
| Meningitis .. .. .. | .. | 1 |
| Aneurism of Aorta .. .. | .. | 1 |
| Total .. .. | .. | 3 |

APPENDIX No. XXI—*continued.*

ABSTRACT No. 15, showing the Admissions into Hospital and Deaths among the Black Troops serving in the Windward and Leeward Command, Jamaica, Honduras, and Bahamas, in the Year 1870, and the Disabilities of those Discharged the Service as Invalids during the same period, in the West Indies and Western Africa.

| Stations | Windward and Leeward Command. | | Jamaica. | | Honduras. | | Bahamas. | | Black Troops in West Indies and W. Africa. |
|---|---|---|---|---|---|---|---|---|---|
| Average Strength | 456 | | 516 | | 183 | | 202 | | 1,795 |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Discharged as Invalids. |
| I. *General Diseases.* | | | | | | | | | |
| 1. Febrile: | | | | | | | | | |
| Enteric Fever | .. | .. | .. | .. | .. | .. | 2 | .. | .. |
| Simple Continued Fever | 19 | 2 | 25 | 1 | .. | .. | .. | .. | .. |
| Ague | 30 | .. | 11 | .. | 12 | .. | 14 | .. | .. |
| Remittent Fever | 2 | .. | 5 | .. | 72 | .. | 3 | 1 | .. |
| Influenza | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Mumps | 14 | .. | 1 | .. | .. | .. | .. | .. | .. |
| 2. Constitutional: | | | | | | | | | |
| Acute Rheumatism | 4 | .. | 6 | .. | 1 | .. | 7 | .. | .. |
| Chronic „ | 37 | .. | 6 | .. | 6 | .. | 6 | .. | 4 |
| Muscular „ | 2 | .. | 2 | .. | 4 | .. | .. | .. | .. |
| Primary Syphilis | 39 | .. | 48 | .. | 7 | .. | 43 | .. | .. |
| Secondary | 2 | .. | 21 | .. | 2 | .. | 9 | .. | 4 |
| Scrofula | 2 | .. | 6 | .. | .. | .. | 1 | .. | 3 |
| Phthisis Pulmonalis | 6 | 1 | 10 | 7 | 1 | .. | 5 | 2 | 1 |
| Hæmoptysis (Tub.) | .. | .. | 2 | .. | .. | .. | 2 | .. | 2 |
| Tubercular Meningitis | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Anæmia | 1 | .. | .. | .. | .. | .. | .. | .. | 1 |
| II. *Local Diseases.* | | | | | | | | | |
| 1. Of the Nervous System: | | | | | | | | | |
| Meningitis | .. | .. | 2 | 1 | .. | .. | .. | .. | .. |
| Apoplexy | .. | .. | 2 | 2 | .. | .. | .. | .. | .. |
| Paralysis | 1 | .. | .. | .. | 1 | .. | .. | .. | .. |
| Neuralgia | 9 | .. | 1 | .. | 3 | .. | .. | .. | .. |
| Dementia | .. | .. | 3 | 1 | .. | .. | .. | .. | .. |
| 2. Of the Eye: | | | | | | | | | |
| Conjunctivitis | 4 | .. | 6 | .. | 3 | .. | .. | .. | .. |
| Tarsal Ophthalmia | .. | .. | .. | .. | 1 | .. | 1 | .. | 1 |
| Gonorrhœal „ | 2 | .. | 1 | .. | .. | .. | .. | .. | .. |
| Sclerotitis | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| 3. Of the Ear: | | | | | | | | | |
| Deafness | .. | .. | .. | .. | .. | .. | .. | .. | 1 |
| 5. Circulatory System: | | | | | | | | | |
| Valve Disease of Heart | .. | .. | .. | 1 | .. | .. | 2 | 1 | .. |
| Hypertrophy „ | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Palpitation „ | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| 6. Absorbent System: | | | | | | | | | |
| Inflam: of Glands | 13 | .. | 10 | .. | 4 | .. | 2 | .. | .. |

Abstract No. 15—*continued.*

| Stations | Windward and Leeward Command. | | Jamaica. | | Honduras. | | Bahamas. | | Black Troops in West Indies and W. Africa. |
|---|---|---|---|---|---|---|---|---|---|
| Average Strength | 456 | | 516 | | 183 | | 202 | | 1,795 |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Discharged as Invalids. |
| 8. Respiratory System: | | | | | | | | | |
| Bronchitis | 37 | .. | 8 | .. | 2 | .. | 12 | .. | .. |
| Pneumonia | 1 | .. | 4 | 1 | .. | .. | 5 | 1 | .. |
| Pleurisy | 1 | .. | 2 | 1 | .. | .. | 1 | .. | .. |
| Emphysema | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| 9. Digestive System: | | | | | | | | | |
| Inflam. of Gums | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Tonsillitis | 19 | .. | 6 | .. | 1 | .. | 3 | .. | .. |
| Gastritis | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Dyspepsia | 7 | .. | .. | .. | 4 | .. | 3 | .. | .. |
| Enteritis | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| Dysentery | .. | .. | 3 | .. | 6 | .. | .. | .. | .. |
| Diarrhœa | 8 | 1 | 4 | .. | 1 | .. | 1 | .. | .. |
| Melæna | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Hernia | .. | .. | 2 | .. | .. | .. | .. | .. | .. |
| Colic | 3 | .. | 1 | .. | 3 | .. | 1 | .. | .. |
| Tænia Solium | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| Constipation | 2 | .. | 1 | .. | 5 | .. | .. | .. | .. |
| Fistula in Ano | .. | .. | .. | .. | 1 | .. | 1 | .. | .. |
| Hæmorrhoids | .. | .. | 1 | .. | 2 | .. | 1 | .. | .. |
| Hepatitis | 4 | 1 | 1 | .. | 1 | .. | 1 | .. | 1 |
| Jaundice | 1 | .. | .. | .. | .. | .. | 1 | .. | .. |
| Splenitis | 1 | .. | 1 | .. | 3 | .. | .. | .. | .. |
| Ascites | .. | .. | .. | .. | .. | .. | 2 | .. | .. |
| Obstruction of Vena Portæ | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| 10. Urinary System: | | | | | | | | | |
| Nephritis | .. | .. | .. | .. | .. | .. | 1 | .. | .. |
| Gonorrhœa | 33 | .. | 45 | .. | 24 | .. | 36 | .. | .. |
| Phimosis, &c. | 1 | .. | 1 | .. | 1 | .. | 1 | .. | .. |
| Bubo | 1 | .. | 4 | .. | .. | .. | .. | .. | .. |
| Epididymitis Gon. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Stricture of Urethra | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Hæmorrhage of Urethra | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Calculus | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| 11. Generative System: | | | | | | | | | |
| Hydrocele | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Orchitis | 17 | .. | 9 | .. | 2 | .. | 1 | .. | 1 |
| Protrusion of Tubuli | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| 12. Organs of Locomotion: | | | | | | | | | |
| Ostitis | 1 | .. | 1 | .. | .. | .. | .. | .. | 1 |
| Caries | .. | .. | 3 | .. | .. | .. | .. | .. | 1 |
| Necrosis | .. | .. | 1 | .. | 1 | 1 | .. | .. | 1 |
| Synovitis | 1 | .. | 1 | .. | 2 | .. | .. | .. | .. |
| Psoas Abscess | .. | .. | 1 | 1 | .. | .. | .. | .. | .. |
| Osseous Tumour | .. | .. | 1 | .. | .. | .. | .. | .. | .. |

Abstract No. 15—*continued.*

| Stations | Windward and Leeward Command. | | Jamaica. | | Honduras. | | Bahamas. | | Black Troops in West Indies and W. Africa. |
|---|---|---|---|---|---|---|---|---|---|
| Average Strength | 456 | | 516 | | 188 | | 202 | | 1,795 |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Discharged as Invalids. |
| 13. Of Cellular Tissue: | | | | | | | | | |
| Abscess of Cellular Tissue | 2 | .. | 17 | .. | 4 | .. | 2 | .. | 1 |
| Guinea Worm | 4 | .. | .. | .. | .. | .. | .. | .. | .. |
| 14. Cutaneous System: | | | | | | | | | |
| Herpes | 4 | .. | .. | .. | 1 | .. | 1 | .. | .. |
| Eczema | 2 | .. | .. | .. | 1 | .. | .. | .. | .. |
| Ulcer | 27 | .. | 31 | .. | 9 | .. | 5 | .. | 1 |
| Boil | 6 | .. | 2 | .. | 1 | .. | 7 | .. | .. |
| Whitlow | 4 | .. | 1 | .. | .. | .. | 1 | .. | .. |
| Tumour | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Elephantiasis | 1 | .. | .. | .. | .. | .. | .. | .. | 1 |
| Itch | 3 | .. | .. | .. | .. | .. | .. | .. | .. |
| Warts | .. | .. | .. | .. | .. | .. | 2 | .. | .. |
| Lichen | .. | .. | .. | .. | .. | .. | 1 | .. | .. |
| III. *Conditions, &c.* | | | | | | | | | |
| General Debility | .. | .. | 3 | .. | .. | .. | 1 | .. | .. |
| IV. *Poisons, &c.* | | | | | | | | | |
| Delirium Tremens | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Alcohol | .. | .. | .. | .. | .. | .. | 1 | .. | .. |
| V. *Injuries.* | | | | | | | | | |
| 2. Accidental: | | | | | | | | | |
| Burns and Scalds | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| Asphyxia by Drowning | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| Contusion | 14 | .. | 8 | .. | 12 | .. | 6 | .. | .. |
| Fracture | 1 | .. | 1 | .. | .. | .. | 1 | .. | .. |
| Wounds | 7 | .. | 7 | .. | 9 | .. | 14 | .. | .. |
| Sprain | 5 | .. | .. | .. | 1 | .. | 2 | .. | .. |
| Dislocation | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Blisters of the Feet | 16 | .. | .. | .. | .. | .. | 3 | .. | .. |
| 4. Self-inflicted: | | | | | | | | | |
| Poison | .. | .. | 1 | 1 | .. | .. | .. | .. | .. |
| VI. *Surgical Operations.* | | | | | | | | | |
| Amputation of Thigh | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| No appreciable Disease | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Total | 431 | 5 | 349 | 19 | 219 | 2 | 215 | 5 | 25 |

APPENDIX No. XXI—*continued.*

ABSTRACT No. 16, showing the Admissions into Hospital and Deaths among the Black Troops serving in Western Africa, during the Year 1870.

| Stations | Sierra Leone. | | Gold Coast. | |
|---|---|---|---|---|
| Strength | 229 | | 209 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. |
| I. *General Diseases.* | | | | |
| 1. Febrile: | | | | |
| Febricula | 1 | .. | .. | .. |
| Ague | 1 | .. | 39 | .. |
| Remittent Fever | 60 | .. | 19 | .. |
| 2. Constitutional: | | | | |
| Acute Rheumatism | 4 | .. | 2 | .. |
| Chronic „ | 6 | .. | 9 | .. |
| Muscular „ | 5 | .. | 3 | .. |
| Primary Syphilis | 34 | .. | 11 | .. |
| Secondary „ | 2 | 1 | 8 | .. |
| Scrofula | 1 | .. | .. | .. |
| Phthisis Pulmonalis | 1 | 1 | 1 | .. |
| Hæmoptysis (Tub.) | 1 | .. | .. | .. |
| Anæmia | 1 | .. | .. | .. |
| II. *Local Diseases.* | | | | |
| 1. Of the Nervous System: | | | | |
| Encephalitis | .. | .. | 1 | .. |
| Meningitis | .. | .. | 1 | 1 |
| Neuralgia | .. | .. | 1 | .. |
| Mania | 1 | .. | .. | .. |
| Dementia | .. | .. | 4 | 1 |
| 2. Of the Eye: | | | | |
| Conjunctivitis | 4 | .. | 3 | .. |
| Tarsal Ophthalmia | 1 | .. | 3 | .. |
| Keratitis | 1 | .. | .. | .. |
| 5. Circulatory System: | | | | |
| Palpitation of Heart | 2 | .. | .. | .. |
| Aneurism | .. | .. | 1 | 1 |
| 6. Absorbent System: | | | | |
| Inflam: of Glands | 2 | .. | 1 | .. |
| 8. Respiratory System: | | | | |
| Bronchitis | 7 | .. | 8 | .. |
| Asthma | .. | 1 | .. | .. |
| Pneumonia | 3 | 1 | 1 | 1 |
| Pleurisy | 1 | .. | .. | .. |
| 9. Digestive System: | | | | |
| Tonsillitis | 1 | .. | 1 | .. |
| Dyspepsia | .. | .. | 1 | .. |
| Dysentery | 1 | .. | 8 | .. |
| Diarrhœa | 1 | .. | 11 | .. |

Abstract No. 16—*continued.*

| Stations | Sierra Leone. | | Gold Coast. | |
|---|---|---|---|---|
| Strength | 229 | | 209 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. |
| Hernia | .. | .. | 1 | .. |
| Tænia Solium | 1 | .. | 1 | .. |
| Hæmorrhoids | .. | .. | 1 | .. |
| Hepatitis | .. | .. | 1 | .. |
| Ascites | 1 | .. | .. | .. |
| Quinsy | 1 | .. | .. | .. |
| Cirrhosis of Liver | 1 | 1 | .. | .. |
| Congestion „ | .. | .. | 1 | .. |
| Sore Throat | 1 | .. | .. | .. |
| 10. Urinary System: | | | | |
| Nephritis | .. | .. | 1 | .. |
| Gonorrhœa | 35 | .. | 26 | .. |
| Phimosis, &c. | 1 | .. | .. | .. |
| Bubo | 3 | .. | 2 | .. |
| Stricture of Urethra | .. | .. | 1 | .. |
| Cedema of Penis | 1 | .. | .. | .. |
| Hæmaturia | .. | .. | 1 | .. |
| Cystitis | .. | .. | 1 | .. |
| 11. Generative System: | | | | |
| Orchitis | 3 | .. | 6 | .. |
| 12. Organs of Locomotion: | | | | |
| Necrosis | 1 | .. | .. | .. |
| Acute Synovitis | 1 | .. | 1 | .. |
| Nodes | 1 | .. | .. | .. |
| 13. Of Cellular Tissue: | | | | |
| Abscess of Cellular Tissue | 3 | .. | 2 | .. |
| Guinea Worm | .. | .. | 2 | .. |
| 14. Cutaneous System: | | | | |
| Herpes | 1 | .. | .. | .. |
| Eczema | .. | .. | 1 | .. |
| Ulcer | 20 | .. | 12 | .. |
| Boil | 2 | .. | 1 | .. |
| V. *Injuries.* | | | | |
| 2. Accidental: | | | | |
| Contusion | 2 | .. | 1 | .. |
| Wounds | 8 | .. | 10 | .. |
| Sprain | 2 | .. | 1 | .. |
| Total | 231 | 5 | 211 | 4 |

APPENDIX No. XXI—*continued.*

ABSTRACT No. 17, showing the Admissions into Hospital, and Deaths, among the Troops serving at the Cape of Good Hope and St. Helena, Mauritius, Ceylon and Labuan, in the year 1870.

| Stations.. | Cape and St. Helena. | | Mauritius. | | Ceylon. | | | | Labuan. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | White. | | Black. | | Black. | |
| Strength | 2,941 | | 665 | | 906 | | 846 | | 139 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| *I. General Diseases.* | | | | | | | | | | |
| 1. Febrile: | | | | | | | | | | |
| Chicken Pox | 1 | .. | .. | .. | .. | .. | 2 | .. | .. | .. |
| Measles | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Scarlet Fever | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Enteric „ | 6 | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Simple continued Fever | 75 | 1 | 18 | .. | 21 | .. | .. | .. | 1 | .. |
| Febricula | 67 | .. | 12 | .. | 26 | .. | 1 | .. | .. | .. |
| Ague | 78 | .. | 185 | .. | 88 | .. | 208 | .. | 167 | 15 |
| Remittent Fever | 48 | .. | 73 | 2 | 21 | .. | 13 | 1 | 7 | 3 |
| Cholera | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. |
| Influenza | 11 | .. | 2 | .. | 12 | .. | .. | .. | .. | .. |
| Erysipelas | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Mumps | 3 | .. | .. | .. | .. | .. | 2 | .. | .. | .. |
| 2. Constitutional: | | | | | | | | | | |
| Acute Rheumatism | 58 | .. | 5 | .. | 11 | .. | 24 | 1 | 3 | .. |
| Chronic „ | 61 | .. | .. | .. | 6 | .. | 12 | .. | 2 | .. |
| Muscular „ | 13 | .. | 18 | .. | 8 | .. | 4 | .. | .. | .. |
| Gonorrhœal Rheumatism | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Gout | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Primary Syphilis | 366 | .. | 29 | .. | 74 | .. | 8 | .. | .. | .. |
| Secondary „ | 93 | .. | 16 | .. | 20 | .. | 4 | .. | .. | .. |
| Scrofula | 5 | .. | 3 | .. | .. | .. | .. | .. | .. | .. |
| Morbus Coxarius | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Phthisis Pulmonalis | 31 | 10 | 4 | 2 | 4 | 2 | 2 | .. | .. | .. |
| Hæmoptysis (Tubercular) | 3 | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Scurvy | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Anæmia | 2 | .. | 3 | .. | 18 | .. | 6 | .. | 15 | 5 |
| General Dropsy | 2 | .. | .. | .. | .. | .. | 1 | .. | 1 | 1 |
| Diabetes | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. |
| Beri-beri | .. | .. | .. | .. | .. | .. | 14 | .. | 17 | 2 |
| *II. Local Diseases.* | | | | | | | | | | |
| 1. Diseases of the Nervous System: | | | | | | | | | | |
| Encephalitis | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Meningitis | 1 | 1 | .. | .. | 2 | .. | .. | .. | .. | .. |
| Apoplexy | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. |
| Sunstroke | 2 | .. | 1 | .. | 1 | .. | .. | .. | .. | .. |
| Softening of Brain | 5 | .. | .. | .. | .. | .. | .. | .. | .. | .. |

Abstract No. 17—*continued.*

| Stations.. | Cape and St. Helena. | | Mauritius. | | Ceylon. White. | | Ceylon. Black. | | Labuan. Black. | |
|---|---|---|---|---|---|---|---|---|---|---|
| *Strength* | 2,941 | | 665 | | 906 | | 846 | | 139 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| Paralysis | 8 | 1 | 1 | .. | .. | .. | 1 | 1 | .. | .. |
| Epilepsy | 3 | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Neuralgia | 11 | .. | .. | .. | 6 | .. | 1 | .. | .. | .. |
| Mania | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Dementia | 6 | .. | 2 | 1 | .. | .. | .. | .. | .. | .. |
| 2. Diseases of the Eye: | | | | | | | | | | |
| Conjunctivitis | 85 | .. | 5 | .. | 33 | .. | 31 | .. | 2 | .. |
| Tarsal Ophthalmia | 39 | .. | 5 | .. | .. | .. | .. | .. | .. | .. |
| Purulent „ | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Iritis | 1 | .. | 3 | .. | 5 | .. | .. | .. | .. | .. |
| *Keratitis* | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Amaurosis* | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Hemeralopia* | .. | .. | .. | .. | 5 | .. | .. | .. | .. | .. |
| *Nyctalopia* | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| 3. Diseases of the Ear: | | | | | | | | | | |
| Inflamm: Membr: Tympani. | 5 | .. | 1 | .. | 1 | .. | .. | .. | .. | .. |
| Deafness | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Inflamm: Ext: Meatus | 4 | .. | 1 | .. | 12 | .. | .. | .. | .. | .. |
| Abscess | 1 | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| 5. Circulatory System: | | | | | | | | | | |
| Pericarditis | 1 | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Valve Disease of Heart | 12 | 3 | .. | .. | 2 | .. | .. | .. | 1 | 1 |
| Hypertrophy „ | 1 | .. | .. | .. | 1 | 1 | .. | .. | .. | .. |
| Syncope | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Palpitation | 27 | .. | 2 | .. | 7 | .. | 1 | .. | .. | .. |
| Aneurism of Aorta | 1 | 1 | 1 | .. | 1 | 1 | .. | .. | .. | .. |
| Phlebitis | .. | .. | .. | .. | 3 | 1 | .. | .. | .. | .. |
| Varicose Veins | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| 6. Absorbent System: | | | | | | | | | | |
| Inflamm: of Lymphatics | .. | .. | .. | .. | 2 | .. | .. | .. | .. | .. |
| Inflamm. of Glands | 32 | .. | 7 | .. | 27 | .. | 7 | .. | .. | .. |
| Suppuration „ | 7 | .. | 4 | .. | 5 | .. | .. | .. | .. | .. |
| Hypertrophy „ | 15 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 8. Respiratory System: | | | | | | | | | | |
| Coryza | .. | .. | 1 | .. | 1 | .. | .. | .. | .. | .. |
| Laryngitis | 2 | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Bronchitis | 97 | .. | 22 | .. | 50 | 1 | 46 | 1 | 7 | 1 |
| Asthma | 1 | .. | .. | .. | 1 | .. | 3 | .. | .. | .. |
| Pneumonia | 19 | 1 | .. | .. | 1 | .. | 4 | .. | .. | .. |
| Pulmonary Extravasation | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Pleurisy | 4 | .. | .. | .. | .. | .. | 2 | 1 | .. | .. |
| 9. Digestive System: | | | | | | | | | | |
| Inflammation of Gums | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Gum Boil | .. | .. | .. | .. | 2 | .. | 1 | .. | .. | .. |
| Stomatitis | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| Abscess of Antrum | 1 | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| Toothache | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| Tonsillitis | 60 | .. | 5 | .. | 15 | .. | 2 | .. | .. | .. |
| Gastritis | 3 | .. | 13 | .. | .. | .. | .. | .. | .. | .. |

Abstract No. 17—*continued.*

| Stations.. | Cape and St. Helena. | | Mauritius. | | Ceylon. | | | | Labuan. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | White. | | Black. | | Black. | |
| Strength | 2,941 | | 665 | | 906 | | 846 | | 139 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admit | Died. |
| Dyspepsia | 105 | .. | 15 | .. | 59 | .. | 1 | .. | .. | .. |
| Dysentery | 17 | 1 | 10 | .. | 71 | 3 | 5 | 1 | 2 | .. |
| Diarrhœa | 44 | .. | 32 | .. | 121 | 1 | 13 | .. | 2 | .. |
| Hernia | 2 | .. | .. | .. | 3 | .. | 3 | .. | .. | .. |
| Colic | 12 | .. | 3 | .. | 10 | .. | 8 | .. | 2 | .. |
| Tænia Solium | 3 | .. | 3 | .. | .. | .. | .. | .. | .. | .. |
| Ascaris Lumbricoides | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Constipation | .. | .. | .. | .. | 5 | .. | .. | .. | .. | .. |
| Fistula in Ano | 6 | .. | 1 | .. | 2 | .. | .. | .. | .. | .. |
| Hæmorrhoids | 21 | .. | 3 | .. | 16 | .. | .. | .. | .. | .. |
| Hepatitis | 66 | 4 | 22 | .. | 37 | 5 | 2 | .. | .. | .. |
| Gall Stones | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Jaundice | 5 | .. | .. | .. | 3 | .. | .. | .. | .. | .. |
| Splenitis | 6 | .. | 6 | .. | .. | .. | .. | .. | .. | .. |
| Peritonitis | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Ascites | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| Hæmorrhage | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Prolapsus Ani | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| „ of Rectum | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Condyloma of Anus | 2 | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| 10. Urinary System: | | | | | | | | | | |
| Bright's Disease | .. | .. | .. | .. | 6 | 1 | .. | .. | .. | .. |
| Nephritis | 2 | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| Gonorrhœa | 650 | .. | 41 | .. | 66 | .. | 12 | .. | .. | .. |
| Phimosis, &c. | 3 | .. | .. | .. | 2 | .. | 1 | .. | .. | .. |
| Bubo | 23 | .. | 6 | .. | .. | .. | .. | .. | .. | .. |
| Epididymitis (Gon:) | 13 | .. | .. | .. | 2 | .. | 4 | .. | .. | .. |
| Stricture of Urethra | 14 | .. | 3 | .. | 2 | .. | 2 | .. | 1 | .. |
| Urinary Fistula | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Irritability of Bladder | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Incontinence of Urine | 3 | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Retention of „ | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Warts | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Cystitis | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 11. Generative System: | | | | | | | | | | |
| Varicocele | 2 | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Hydrocele | 1 | .. | .. | .. | .. | .. | 4 | .. | .. | .. |
| Hæmatocele | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| Orchitis | 44 | .. | .. | .. | 21 | .. | 13 | .. | 1 | .. |
| Abscess of Testicle | 1 | .. | 11 | .. | .. | .. | .. | .. | .. | .. |
| Spermatorrhœa | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 12. Organs of Locomotion: | | | | | | | | | | |
| Ostitis | 1 | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Caries | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Necrosis | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Synovitis | 8 | .. | .. | .. | 3 | .. | .. | .. | .. | .. |
| Dropsy of Joint | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |

Abstract No. 17—*continued.*

| Stations | Cape and St. Helena. | | Mauritius. | | Ceylon. White. | | Ceylon. Black. | | Labuan Black. | |
|---|---|---|---|---|---|---|---|---|---|---|
| Strength | 2,941 | | 665 | | 906 | | 846 | | 139 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| Bursal Tumour | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Talipes Equino-valgus | .. | .. | .. | .. | 2 | .. | .. | .. | .. | .. |
| Contraction | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Loose Cartilage | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Exostosis of Sternum | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| 13. Diseases of Cellular Tissue: | | | | | | | | | | |
| Inflammation of Cellular Tissue | 7 | .. | 1 | .. | 3 | .. | 3 | .. | .. | .. |
| Abscess " " | 61 | .. | 10 | .. | 39 | .. | 20 | .. | 2 | .. |
| Tumour | .. | .. | .. | .. | 2 | .. | .. | .. | .. | .. |
| Œdema of Face | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| 14. Cutaneous System: | | | | | | | | | | |
| Urticaria | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Lichen | 1 | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Psoriasis | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Herpes | 3 | .. | .. | .. | 4 | .. | 3 | .. | .. | .. |
| Eczema | 27 | .. | 2 | .. | 10 | .. | 2 | .. | .. | .. |
| Impetigo | 5 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Intertrigo | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Ingrown Nail | 3 | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Ecthyma | 2 | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Erythema | .. | .. | .. | .. | 3 | .. | .. | .. | .. | .. |
| Tumour | 1 | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Ephidrosis | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Acne | 6 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Cyst | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Hypertrophy | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Ulcer | 150 | .. | 38 | .. | 97 | .. | 52 | .. | 8 | .. |
| Boil | 33 | .. | 7 | .. | 8 | .. | 14 | .. | 7 | .. |
| Carbuncle | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Whitlow | 7 | .. | 2 | .. | 3 | .. | 4 | .. | .. | .. |
| Itch | 16 | .. | 1 | .. | .. | .. | 30 | .. | 3 | .. |
| Warts | 5 | .. | .. | .. | 7 | .. | .. | .. | .. | .. |
| III. *Conditions, &c.*: | | | | | | | | | | |
| General Debility | 32 | 1 | 2 | .. | 3 | .. | 5 | .. | .. | .. |
| IV. *Poisons.* | | | | | | | | | | |
| Delirium Tremens | 29 | .. | 12 | 2 | 5 | 1 | .. | .. | .. | .. |
| Alcoholic Poisoning | .. | 3 | 12 | .. | 9 | .. | .. | .. | .. | .. |
| Snake Bite | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| V. *Injuries.* | | | | | | | | | | |
| 2. Accidental: | | | | | | | | | | |
| Burns and Scalds | 6 | .. | 2 | .. | 2 | .. | 2 | .. | .. | .. |
| Multiple Injury | 3 | 1 | .. | .. | .. | .. | .. | .. | .. | .. |

Abstract No. 17—*continued*.

| bns .. .. .. .. | Cape and St. Helena. | | Mauritius. | | Ceylon. White. | | Ceylon. Black. | | Labuan. Black. | |
|---|---|---|---|---|---|---|---|---|---|---|
| gth .. .. .. .. | 2,941 | | 665 | | 906 | | 846 | | 139 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| phyxia by Drowning .. .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| ntusion .. .. .. .. | 132 | .. | 32 | .. | 65 | .. | 23 | .. | 3 | .. |
| ncussion of the Brain .. .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| acture .. .. .. .. | 28 | 1 | .. | .. | 7 | .. | 1 | .. | .. | .. |
| ounds .. .. .. .. | 115 | .. | 12 | .. | 27 | .. | 17 | .. | 2 | .. |
| „ from Gunshot .. .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| prain .. .. .. .. .. | 68 | .. | 9 | .. | 16 | .. | 5 | .. | .. | .. |
| Dislocation .. .. .. .. | 3 | .. | .. | .. | 3 | .. | .. | .. | .. | .. |
| Blisters of the Feet .. .. .. | 15 | .. | 4 | .. | 4 | .. | .. | .. | .. | .. |
| 4. Self-inflicted: | | | | | | | | | | |
| Gunshot .. .. .. .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| VI. *Surgical Operations.* | | | | | | | | | | |
| Amputation of Leg .. .. .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| „ of Finger .. .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| No appreciable Disease .. .. | 6 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Totals .. .. .. | 3,2-3 | 37 | 753 | 7 | 1253 | 17 | 659 | 8 | 256 | 28 |

CAUSES of the Deaths of the Invalids.

| | Cape and St. Helena. | Mauritius. | Ceylon. White. | Labuan. Black. |
|---|---|---|---|---|
| Ague .. .. .. | 1 | 1 | .. | 4 |
| Secondary Syphilis .. | 1 | .. | .. | .. |
| Phthisis Pulmonalis .. | 1 | 2 | 1 | .. |
| Beri-Beri .. .. .. | .. | .. | .. | 2 |
| Epilepsy .. .. .. | 1 | .. | .. | .. |
| Valve Disease of Heart .. | .. | .. | 1 | .. |
| Aneurism of Aorta .. | .. | 1 | .. | .. |
| Dysentery .. .. .. | .. | .. | 1 | .. |
| Total .. .. | 4 | 4 | 3 | 6 |

APPENDIX No. XXI—*continued.*

ABSTRACT No. 18, showing the Number of Men sent home from the Cape of Good Hope and St. Helena, Mauritius, and Ceylon, in 1870, as Invalids, and of Invalids finally discharged the Service in these Colonies and at Netley.

| Diseases. | Invalids. | | | | | | |
|---|---|---|---|---|---|---|---|
| | Sent Home from | | | Discharged at Ceylon. Black Troops. | Discharged at Netley from | | |
| | Cape and St. Helena. | Mauritius. | Ceylon. White. | | Cape and St. Helena. | Mauritius. | Ceylon. |
| *I. General Diseases.* | | | | | | | |
| Simple Contiuued Fever .. .. | 1 | .. | .. | .. | .. | .. | .. |
| Ague .. .. .. .. .. | 1 | 21 | .. | .. | .. | .. | .. |
| Acute Rheumatism .. .. .. | .. | 1 | .. | .. | .. | .. | .. |
| Chronic „ .. .. .. | 6 | .. | .. | 11 | 3 | .. | 1 |
| Gonorrhœal „ .. .. .. | 1 | .. | .. | .. | .. | .. | .. |
| Secondary Syphilis .. .. .. | 10 | .. | 3 | 2 | 7 | .. | 2 |
| Scrofula .. .. .. .. | 2 | 1 | .. | .. | 2 | 1 | .. |
| Phthisis Pulmonalis .. .. | 13 | 3 | 2 | 1 | 14 | 4 | 9 |
| Anæmia .. .. .. .. | .. | .. | 3 | .. | .. | .. | .. |
| Beri-Beri .. .. .. .. | .. | .. | .. | 4 | .. | .. | .. |
| *II. Local Diseases.* | | | | | | | |
| 1. Diseases of the Nervous System: | | | | | | | |
| Encephalitis .. .. .. .. | 2 | .. | .. | .. | 1 | .. | .. |
| Paralysis .. .. .. .. | 3 | .. | .. | 1 | 2 | 1 | .. |
| Epilepsy .. .. .. .. | 2 | .. | .. | .. | .. | .. | .. |
| Neuralgia .. .. .. .. | 1 | .. | .. | .. | .. | .. | .. |
| Mania .. .. .. .. | 1 | .. | .. | .. | .. | .. | .. |
| Dementia .. .. .. .. | 1 | 1 | .. | .. | .. | .. | .. |
| 2. Diseases of the Eye: | | | | | | | |
| Conjunctivitis .. .. .. | 1 | 1 | .. | 1 | .. | .. | .. |
| Tarsal Ophthalmia .. .. .. | 1 | .. | .. | .. | .. | .. | .. |
| Ulcer of Cornea .. .. .. | .. | .. | .. | .. | .. | 1 | .. |
| Amaurosis .. .. .. .. | 1 | .. | .. | .. | .. | .. | .. |
| Shortsight .. .. .. | .. | .. | .. | .. | 2 | .. | .. |
| Hemeralopia .. .. .. .. | .. | .. | 1 | .. | .. | .. | .. |
| 5. Circulatory System: | | | | | | | |
| Valve Disease of Heart .. .. | 3 | 1 | 2 | .. | 6 | 1 | 1 |
| Hypertrophy „ .. .. | 3 | 1 | .. | .. | .. | .. | .. |
| Palpitation „ .. .. | 1 | .. | 1 | .. | .. | .. | .. |
| Aneurism of Aorta .. .. | .. | 1 | .. | .. | .. | .. | 1 |
| 8. Respiratory System: | | | | | | | |
| Bronchitis .. .. .. .. | 2 | .. | 1 | 2 | 1 | .. | .. |
| Asthma .. .. .. .. | 1 | 1 | 1 | .. | .. | 1 | .. |
| Pneumonia .. .. .. .. | 1 | .. | .. | .. | .. | .. | .. |
| Abscess of Lung .. .. .. | 2 | .. | .. | .. | .. | .. | .. |

Abstract No. 18—*continued.*

| Diseases. | Invalids. | | | | | | |
|---|---|---|---|---|---|---|---|
| | Sent Home from | | | Discharged at Ceylon. Black Troops. | Discharged at Netley from | | |
| | Cape and St. Helena. | Mauritius. | Ceylon. White. | | Cape and St. Helena. | Mauritius. | Ceylon. |
| 9. Digestive System: | | | | | | | |
| Dyspepsia | .. | 1 | .. | .. | 3 | .. | .. |
| Dysentery | 1 | .. | 9 | .. | 1 | 1 | .. |
| Diarrhœa | 1 | .. | 2 | .. | .. | .. | .. |
| Hernia | 1 | .. | 1 | .. | 1 | .. | .. |
| Fistula in Ano | 3 | .. | .. | .. | 2 | .. | .. |
| Hepatitis | 16 | 1 | 10 | 1 | 9 | 2 | .. |
| Splenitis | .. | .. | .. | .. | .. | 1 | .. |
| 10. Urinary System: | | | | | | | |
| Bright's Disease | .. | .. | 2 | .. | 1 | .. | .. |
| Nephritis | 2 | .. | .. | .. | .. | .. | .. |
| Epididymitis (Gon:) | 1 | .. | 2 | .. | .. | .. | .. |
| Stricture of Urethra | 1 | .. | .. | .. | .. | .. | 1 |
| 11. Generative System: | | | | | | | |
| Orchitis | 1 | .. | .. | .. | .. | .. | .. |
| 12. Organs of Locomotion: | | | | | | | |
| Caries | .. | .. | 1 | .. | .. | .. | .. |
| Synovitis | 2 | .. | .. | .. | 1 | .. | .. |
| Talipes Equino-Valgus | .. | .. | 1 | .. | .. | .. | .. |
| Inflammation of Foot | .. | .. | 1 | .. | .. | .. | .. |
| Contraction | 2 | .. | .. | .. | 1 | .. | 1 |
| 14. Cutaneous System: | | | | | | | |
| Eczema | 1 | .. | .. | .. | .. | .. | .. |
| Ulcer | 2 | .. | 1 | 1 | .. | .. | .. |
| Tumour | 1 | .. | .. | .. | .. | .. | .. |
| III. *Conditions, &c.* | | | | | | | |
| General Debility | 4 | 1 | 2 | 23 | 3 | .. | 1 |
| V. *Injuries.* | | | | | | | |
| 2. Accidental: | | | | | | | |
| Contusion | .. | .. | 1 | .. | 1 | .. | .. |
| Fracture | 4 | .. | .. | .. | .. | .. | 1 |
| Wounds | 1 | .. | .. | .. | .. | .. | .. |
| Sprain | .. | .. | 1 | .. | .. | .. | .. |
| Dislocation | 2 | .. | 1 | .. | .. | 1 | .. |
| VI. *Surgical Operations.* | | | | | | | |
| Amputation of Leg | .. | .. | .. | .. | 2 | .. | .. |
| Removal of Testicle | .. | .. | .. | .. | 1 | .. | .. |
| Total | 106 | 35 | 49 | 23 | 64 | 14 | 18 |

APPENDIX No. XXI—*continued.*

ABSTRACT No. 19, showing the Admissions into Hospital and Deaths among the Troops serving in China, Japan, and the Straits Settlements in 1870, and the Number of Men sent Home as Invalids, and of those finally Discharged the Service at Netley.

| Stations | China. | | | | Japan. | | Straits Settlements. | | China. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | White. | | Asiatic. | | | | | | White. | | Asiatic |
| Strength | 546 | | 846 | | 624 | | 571 | | | | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Sent Home as Invalids. | Discharged at Netley. | Sent to India as Invalids. |
| I. *General Diseases.* | | | | | | | | | | | |
| Sub-division A: | | | | | | | | | | | |
| Small Pox | .. | .. | 3 | .. | 11 | 3 | .. | .. | .. | .. | .. |
| Measles | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Scarlet Fever | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Typhus „ | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Enteric „ | .. | .. | .. | .. | 5 | .. | .. | .. | .. | .. | .. |
| Simple cont. Fever | .. | .. | .. | .. | 42 | .. | 1 | .. | .. | .. | .. |
| Febricula | 1 | .. | 2 | .. | 65 | .. | 47 | .. | .. | .. | .. |
| Ague | 11 | .. | 726 | 6 | 2 | .. | 86 | .. | .. | 1 | 3 |
| Remittent Fever | 570 | 1 | 33 | .. | 6 | .. | 4 | .. | 15 | .. | .. |
| Diphtheria | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Influenza | 2 | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| Erysipelas | 1 | .. | .. | .. | 1 | .. | 1 | .. | .. | .. | .. |
| Sub-division B: | | | | | | | | | | | |
| Acute Rheumatism | .. | .. | 11 | .. | 10 | .. | 2 | 1 | .. | .. | 1 |
| Gonorrheal „ | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| Chronic „ | 6 | .. | .. | .. | 2 | .. | 4 | .. | .. | 1 | .. |
| Muscular „ | 1 | .. | 1 | .. | 9 | .. | 13 | .. | .. | .. | .. |
| Gout | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| Primary Syphilis | 9 | .. | 5 | .. | 112 | .. | 33 | .. | .. | .. | .. |
| Secondary „ | 22 | .. | 5 | .. | 50 | .. | 14 | .. | 2 | .. | .. |
| Scrofula | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Phthisis Pulmonalis | 8 | 1 | 1 | 2 | 4 | 1 | 2 | .. | 4 | 2 | .. |
| Hæmoptysis (Tub.) | 3 | 1 | 1 | .. | .. | .. | .. | .. | 1 | 1 | .. |
| Purpura | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Anæmia | 2 | .. | 1 | .. | 1 | .. | .. | .. | .. | .. | .. |
| Beri-Beri | .. | .. | 3 | 1 | .. | .. | .. | .. | .. | .. | 2 |
| II. *Local Diseases.* | | | | | | | | | | | |
| 1. Diseases of the Nervous System: | | | | | | | | | | | |
| Meningitis | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. |
| Apoplexy | .. | .. | 1 | 1 | 1 | 1 | 1 | .. | .. | .. | .. |
| Paralysis | 1 | .. | 3 | 2 | 2 | .. | .. | .. | .. | .. | .. |
| Locomotor Ataxy | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | 3 |
| Epilepsy | 1 | .. | 1 | .. | 2 | .. | 1 | .. | 1 | .. | .. |
| Chorea | .. | .. | .. | .. | .. | .. | 3 | .. | 1 | .. | .. |
| Neuralgia | 1 | .. | .. | .. | .. | .. | 8 | .. | .. | .. | .. |
| Mania | 1 | .. | 1 | .. | .. | .. | 1 | .. | 1 | .. | .. |
| Melancholia | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Dementia | 3 | .. | 3 | .. | 3 | .. | .. | .. | 1 | .. | .. |

Abstract No. 19—*continued.*

| Stations | China. | | | | Japan. | | Straits Settlements. | | China. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | White. | | Asiatic. | | | | | | White. | | Asiatic. |
| Strength | 546 | | 846 | | 624 | | 571 | | | | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Sent Home as Invalids. | Discharged at Netley. | Sent to India as Invalids. |
| 2. Diseases of the Eye: | | | | | | | | | | | |
| Conjunctivitis | 29 | .. | 8 | .. | 44 | .. | 4 | .. | .. | .. | .. |
| Tarsal Ophthalmia | 2 | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. |
| Amaurosis | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Impaired Vision | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Cataract | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Short sight | 1 | .. | .. | .. | .. | .. | .. | .. | 2 | 1 | .. |
| Hordeolum | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| 3. Diseases of the Ear: | | | | | | | | | | | |
| Inflam: Membr: Tymp: | 1 | .. | .. | .. | .. | .. | 7 | .. | .. | .. | .. |
| Deafness | 2 | .. | .. | .. | 1 | .. | .. | .. | 1 | .. | .. |
| Inflam. ext. Meatus | 9 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Mal. „ „ | | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| 4. Diseases of the Nose: | | | | | | | | | | | |
| Ozœna | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Sebaceous Cyst. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 5. Circulatory Syst: | | | | | | | | | | | |
| Pericarditis | 1 | 1 | .. | .. | 1 | 1 | .. | .. | .. | .. | .. |
| Valve Dis. of Heart | 3 | .. | 1 | 1 | 2 | .. | 7 | .. | 2 | .. | .. |
| Hypertrophy „ | .. | .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. |
| Dilatation „ | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Palpitation „ | 3 | .. | .. | .. | 1 | .. | 15 | .. | .. | .. | .. |
| Aneurism of Aorta | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Varicose Veins | 1 | .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. |
| 6. Absorbent Syst.: | | | | | | | | | | | |
| Inflam of Glands | 1 | .. | .. | .. | .. | .. | 13 | .. | 1 | .. | .. |
| Suppuration „ | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. |
| 8. Respiratory Syst.: | | | | | | | | | | | |
| Bronchitis | 8 | .. | 31 | 3 | 31 | .. | 25 | .. | .. | .. | 3 |
| Asthma | .. | .. | 5 | .. | .. | .. | .. | .. | .. | .. | .. |
| Pneumonia | 2 | .. | 2 | .. | 9 | 1 | 1 | .. | .. | .. | .. |
| Pleurisy | .. | .. | .. | .. | 7 | .. | 6 | 1 | .. | .. | .. |
| Emphysema | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| 9. Digestive Syst.: | | | | | | | | | | | |
| Tonsillitis | 1 | .. | .. | .. | 6 | .. | 6 | .. | .. | .. | .. |
| Pharyngitis | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Hæmatemesis | .. | .. | 1 | .. | 1 | .. | .. | .. | .. | .. | 2 |
| Dyspepsia | 61 | .. | 15 | .. | 11 | .. | 78 | .. | .. | .. | .. |
| Enteritis | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| Typhlitis | .. | .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. |
| Dysentery | 7 | .. | 52 | 1 | 3 | .. | 10 | .. | 1 | 1 | 1 |
| Diarrhœa | 67 | .. | 80 | 4 | 27 | .. | 50 | .. | 2 | .. | 2 |
| Hernia | .. | .. | 1 | .. | 4 | .. | 1 | .. | .. | .. | .. |
| Colic | 1 | .. | 2 | .. | 1 | .. | 3 | .. | .. | .. | .. |
| Cœnia Solium | .. | .. | .. | .. | 1 | .. | 4 | .. | .. | .. | .. |
| Constipation | .. | .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. |

Abstract No. 19—*continued.*

| Stations | China. | | | | Japan. | | Straits Settlements. | | China. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | White. | | Asiatic. | | | | | | White. | | Asiatic. |
| Strength | 546 | | 846 | | 624 | | 571 | | | | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Sent Home as Invalids. | Discharged at Netley. | Discharged at Netley. |
| *Fistula in* Ano | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| *Hæmorrhoids* | 6 | .. | 1 | .. | 2 | .. | 2 | .. | .. | .. | .. |
| Hepatitis | 15 | .. | 1 | .. | 15 | .. | 34 | 1 | 1 | 1 | .. |
| Jaundice | 6 | .. | 1 | .. | 1 | .. | 6 | .. | .. | .. | .. |
| Congestion of Spleen | .. | .. | .. | .. | .. | .. | 4 | .. | .. | .. | .. |
| Ascites | .. | .. | .. | .. | 3 | .. | .. | .. | .. | .. | .. |
| Gum Boil | .. | .. | .. | .. | .. | .. | 4 | .. | .. | .. | .. |
| *10. Urinary Syst.* | | | | | | | | | | | |
| Bright's Disease | .. | .. | .. | .. | 1 | 1 | 1 | .. | .. | .. | .. |
| Nephritis | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Cystitis | 1 | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| Hæmaturia | .. | .. | 1 | .. | 1 | .. | .. | .. | .. | .. | .. |
| Gonorrhœa | 32 | .. | 4 | .. | 240 | .. | 43 | .. | .. | .. | .. |
| Phimosis, &c. | 1 | .. | 1 | .. | 1 | .. | 1 | .. | .. | .. | .. |
| Bubo | 5 | .. | .. | .. | 17 | .. | 8 | .. | .. | .. | .. |
| Epididymitis Gon. | 6 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Stricture of Urethra | 3 | .. | .. | .. | 5 | .. | 3 | .. | .. | .. | .. |
| Balanitis | .. | .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. |
| Condyloma | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *11. Generative Syst.* | | | | | | | | | | | |
| Hydrocele | 5 | .. | .. | .. | 1 | .. | 2 | .. | .. | .. | .. |
| Orchitis | 17 | .. | 2 | .. | 8 | .. | 16 | .. | .. | .. | .. |
| Cystic dis: of Testicle | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| *12. Organs of Loco.* | | | | | | | | | | | |
| Ostitis | .. | .. | 1 | .. | 1 | .. | 1 | .. | .. | .. | .. |
| Enlargement of Bursa | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Bursal Abscess | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *13. Diseases of Cellular Tissue:* | | | | | | | | | | | |
| Inflam: of Cel: Tissue | 6 | .. | 5 | .. | 6 | .. | 3 | .. | .. | .. | .. |
| Abscess „ „ | 9 | .. | 19 | .. | 5 | .. | 8 | .. | .. | .. | .. |
| *14. Cutaneous Syst.* | | | | | | | | | | | |
| Urticaria | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Lichen | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Psoriasis | 1 | .. | 8 | .. | 4 | .. | 3 | .. | .. | .. | .. |
| Herpes | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| Pemphigus | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| Eczema | 2 | .. | 1 | .. | .. | .. | 2 | .. | .. | .. | .. |
| Ulcer | 18 | .. | 10 | .. | 21 | .. | 36 | .. | .. | .. | .. |
| Boil | 16 | .. | 2 | .. | 9 | .. | 16 | .. | .. | .. | .. |
| Carbuncle | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Whitlow | .. | .. | 3 | .. | .. | .. | 1 | .. | .. | .. | .. |
| Itch | .. | .. | 26 | .. | 22 | .. | .. | .. | .. | .. | .. |
| Warts | 5 | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Ringworm | 4 | .. | .. | .. | 1 | .. | 1 | .. | .. | .. | .. |
| Condyloma | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Tumour | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |

Abstract No. 19—*continued.*

| Stations .. .. | China. | | | | Japan. | | Straits Settlements. | | China. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | White. | | Asiatic. | | | | | | White. | | Asiatic. |
| Strength .. .. | 546 | | 846 | | 624 | | 571 | | | | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Sent Home as Invalids. | Discharged at Netley. | Sent to India as Invalids. |
| III. *Conditions, &c.* | | | | | | | | | | | |
| General Debility .. | 6 | .. | 18 | .. | 5 | .. | .. | .. | 3 | 1 | 1 |
| IV. *Poisons.* | | | | | | | | | | | |
| Delirium Tremens.. | 9 | 1 | 4 | 1 | 18 | .. | 5 | .. | .. | .. | .. |
| Alcohol .. .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Opium .. .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Bite of Centipede .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Sting from Wasp .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| V. *Injuries.* | | | | | | | | | | | |
| 2. Accidental: | | | | | | | | | | | |
| Burns and Scalds .. | .. | .. | 2 | .. | 4 | .. | 1 | .. | .. | .. | .. |
| Asphyxia by Drown: | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Contusion .. .. | 35 | .. | 13 | .. | 25 | .. | 51 | .. | .. | .. | .. |
| Injury to Spinal Cord | 1 | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. |
| Fracture .. .. | 1 | .. | 2 | .. | 3 | .. | 5 | .. | .. | .. | .. |
| Wounds .. .. | 6 | .. | 9 | .. | 25 | .. | 20 | .. | .. | .. | .. |
| „ from Gunshot | .. | .. | .. | .. | 1 | .. | 2 | .. | .. | .. | .. |
| Sprain .. .. | 14 | .. | 7 | .. | 17 | .. | 20 | .. | .. | .. | .. |
| Dislocation .. .. | 1 | .. | .. | .. | 2 | .. | 1 | .. | .. | .. | .. |
| Blisters of the Feet | 1 | .. | .. | .. | 3 | .. | 1 | .. | .. | .. | .. |
| Corns on Feet .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 4. Self-inflicted .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| VI. *Surgical Operations:* | | | | | | | | | | | |
| Removal of Foreign Body .. .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| No appreciable disease .. .. | 1 | .. | 1 | .. | 4 | .. | 1 | .. | .. | .. | .. |
| Total .. | 1,096 | 6 | 1,147 | 22 | 968 | 9 | 770 | 3 | 40 | 10 | 18 |

Causes of the Deaths of the Invalids.

| | China. | Japan. | Straits Settlements. |
|---|---|---|---|
| Cancer .. .. .. .. .. | .. | .. | 1 |
| Dementia .. .. .. .. | .. | 1 | .. |
| Valve Disease of Heart .. .. .. | .. | 2 | 1 |
| General Debility.. .. .. .. | 1 | .. | .. |
| Total .. .. .. | 1 | 3 | 2 |

APPENDIX No. XXI—*continued.*

ABSTRACT No. 20, showing the admissions into Hospital and Deaths among Her Majesty's European Troops serving in Bengal, Madras, and Bombay, during the year 1870, and also in Bengal in 1869.

| | 1870. | | | | | | | | 1869. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Bengal. | | Madras. | | Bombay. | | 1st Batt. 21st Regt. | | Bengal. | |
| Average Strength .. | 34,090. | | 9,936 | | 10,557 | | 797. | | 35,173 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| I. *General Diseases.* Sub-division A: | | | | | | | | | | |
| Small Pox .. .. | 21 | 5 | .. | .. | 1 | .. | .. | .. | 128 | 14 |
| Chicken Pox .. | 1 | .. | .. | .. | 1 | .. | .. | .. | 2 | .. |
| Measles .. .. | 5 | .. | 1 | .. | .. | .. | .. | .. | 3 | .. |
| Scarlet Fever .. | 1 | .. | .. | .. | 2 | .. | .. | .. | 3 | .. |
| Typhus „ .. | .. | .. | .. | .. | .. | .. | .. | .. | 4 | 2 |
| Enteric „ .. | 89 | 38 | 37 | 9 | 25 | 18 | 7 | 3 | 61 | 27 |
| Simple Cont: Fever. | 3,849 | 38 | 362 | 1 | 1,017 | 7 | .. | .. | 4,311 | 41 |
| Febricula .. .. | 2,066 | .. | 375 | .. | 439 | .. | .. | .. | 2,573 | .. |
| Ague .. .. | 20,773 | 3 | 1,484 | .. | 5,729 | 6 | 2,505 | .. | 16,897 | 21 |
| Remittent Fever .. | 1,039 | 62 | 44 | 5 | 629 | 24 | 7 | 2 | 2,153 | 96 |
| Cholera .. .. | 54 | 22 | 56 | 37 | 1 | 1 | 2 | 2 | 799 | 538 |
| Influenza .. .. | 79 | .. | 18 | 3 | .. | .. | .. | .. | 72 | .. |
| Erysipelas .. .. | 56 | 2 | 20 | 15 | .. | .. | 6 | .. | 53 | 3 |
| Pyæmia .. .. | 1 | 3 | .. | .. | .. | .. | .. | .. | 2 | 2 |
| Cowpox .. .. | 1 | .. | 1 | .. | .. | .. | .. | .. | 2 | .. |
| Choleraic Diarrhœa | .. | .. | .. | .. | .. | .. | .. | .. | 76 | .. |
| Diphtheria .. .. | 1 | 1 | .. | .. | .. | .. | .. | .. | 1 | 1 |
| Mumps .. .. | 10 | .. | 2 | .. | 10 | .. | 1 | .. | 8 | .. |
| Equinia Mitis .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Sub-division B: | | | | | | | | | | |
| Acute Rheumatism | 633 | .. | 102 | .. | 160 | .. | 29 | .. | 630 | 2 |
| Chronic „ .. | 969 | .. | 236 | .. | 150 | .. | .. | .. | 757 | .. |
| Muscular „ .. | 332 | .. | 88 | .. | 100 | .. | 5 | .. | 376 | .. |
| Primary Syphilis .. | 2,589 | .. | 623 | .. | 711 | .. | 19 | .. | 2,469 | .. |
| Secondary „ .. | 851 | 8 | 371 | 2 | 300 | 2 | 14 | .. | 801 | 4 |
| Cancer .. .. | 7 | 6 | 1 | 2 | 5 | 1 | .. | .. | 3 | 1 |
| Scrofula .. .. | 44 | .. | 11 | .. | 13 | .. | 2 | .. | 72 | 1 |
| Phthisis Pulmonalis | 331 | 50 | 117 | 10 | 98 | 18 | 1 | 1 | 380 | 79 |
| Hæmoptysis (Tub:) | 23 | .. | 1 | .. | 3 | .. | .. | .. | 34 | .. |
| Purpura .. .. | 7 | .. | 1 | .. | 2 | .. | .. | .. | 2 | .. |
| Scurvy .. .. | 23 | .. | 2 | .. | 3 | .. | .. | .. | 20 | .. |
| Anæmia .. .. | 315 | .. | 69 | .. | 164 | .. | 15 | .. | 290 | 4 |
| General Dropsy .. | 7 | .. | 7 | 2 | 5 | 1 | .. | .. | 18 | 1 |
| Gonrrl. Rheumatism | 9 | .. | 2 | .. | 5 | .. | .. | .. | 11 | .. |
| Gout .. .. | 3 | .. | .. | .. | .. | .. | .. | .. | 7 | 1 |
| Chr: Osteo-Arthritis | 2 | .. | 1 | .. | .. | .. | .. | .. | 1 | .. |
| Tumour .. .. | .. | .. | .. | .. | .. | .. | .. | .. | 8 | .. |
| Lupus .. .. | 5 | .. | 1 | .. | 2 | .. | 2 | .. | 4 | .. |
| True Leprosy .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Morbus Coxarius .. | 1 | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| Diabetes .. .. | 4 | .. | 4 | .. | .. | .. | .. | .. | .. | .. |

Abstract No. 20—*continued.*

| | 1870. | | | | | | | | 1871. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Bengal. | | Madras. | | Bombay. | | 1st Batt. 21st Regt. | | Bengal. | |
| Average Strength .. | 34,090 | | 9,936 | | 10,557 | | 797 | | 35,173 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| II. *Local Diseases:* | | | | | | | | | | |
| 1. Nervous System | | | | | | | | | | |
| Encephalitis .. | 18 | 1 | 6 | 1 | 2 | .. | .. | .. | 15 | 1 |
| Meningitis .. | 4 | 2 | 2 | 1 | 2 | 1 | .. | .. | 13 | 7 |
| Apoplexy .. | 17 | 13 | 36 | 14 | 8 | .. | .. | .. | 45 | 37 |
| Paralysis .. .. | 43 | 3 | 8 | .. | 14 | 1 | .. | .. | 78 | 4 |
| Tetanus .. .. | 2 | 2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Epilepsy .. .. | 114 | 1 | 14 | .. | 19 | 1 | 2 | .. | 110 | 3 |
| Neuralgia .. .. | 235 | .. | 82 | .. | 56 | .. | .. | .. | 305 | .. |
| Mania .. .. | 28 | .. | 9 | .. | 2 | .. | .. | .. | 42 | .. |
| Dementia .. .. | 41 | .. | 16 | .. | 22 | 1 | 3 | .. | 72 | 1 |
| Softening of Brain .. | 1 | 1 | .. | .. | .. | .. | .. | .. | 4 | 3 |
| Abscess „ .. | 4 | 3 | 1 | 1 | .. | .. | .. | .. | 1 | 1 |
| Sunstroke .. .. | 78 | 43 | 13 | 6 | 42 | 18 | .. | .. | 219 | 98 |
| Atrophy of Brain .. | .. | .. | 1 | .. | .. | .. | .. | .. | 1 | .. |
| Myelitis .. .. | 1 | 1 | .. | .. | .. | .. | .. | .. | 5 | .. |
| Locomotor Ataxy .. | .. | .. | 9 | .. | .. | .. | .. | .. | .. | .. |
| Hydrophobia .. | 2 | 2 | 1 | 1 | .. | .. | .. | .. | 1 | 1 |
| Convulsions .. | 1 | .. | .. | .. | 2 | .. | .. | .. | 8 | .. |
| Spasm of Muscle .. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Chorea .. .. | 4 | .. | 1 | .. | .. | .. | .. | .. | 2 | .. |
| Catalepsy .. .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| Anæsthesia .. .. | 1 | .. | 1 | .. | .. | .. | .. | .. | 1 | .. |
| Hypochondriasis .. | 3 | .. | 1 | .. | 1 | .. | .. | .. | 2 | .. |
| Spinal Hæmorrhage | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 2. Diseases of the Eye: | | | | | | | | | | |
| Conjunctivitis .. | 684 | .. | 207 | .. | 197 | .. | 8 | .. | 712 | .. |
| Tarsal Ophthalmia | 99 | .. | 20 | .. | 7 | .. | .. | .. | 119 | .. |
| Pterygium .. .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Keratitis .. .. | 12 | .. | 3 | .. | 1 | .. | .. | .. | 9 | .. |
| Ulcer of Cornea .. | 15 | .. | 2 | .. | 1 | .. | .. | .. | .. | .. |
| Sclerotitis .. .. | 5 | .. | 1 | .. | 6 | .. | .. | .. | 5 | .. |
| Iritis .. .. | 24 | .. | 3 | .. | 4 | .. | .. | .. | 21 | .. |
| Choroiditis .. .. | 2 | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| Amaurosis .. .. | .. | .. | 5 | .. | 1 | .. | .. | .. | 8 | .. |
| Impaired Vision.... | 3 | .. | 3 | .. | 3 | .. | .. | .. | .. | .. |
| Retinitis .. .. | 3 | .. | 3 | .. | .. | .. | .. | .. | .. | .. |
| Cataract .. .. | 3 | .. | .. | .. | .. | .. | .. | .. | 2 | .. |
| Disorganization .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| Short Sight.. .. | .. | .. | .. | .. | .. | .. | .. | .. | 13 | .. |
| Hemeralopia .. | 3 | .. | 1 | .. | .. | .. | .. | .. | 6 | .. |
| Nyctalopia .. .. | 2 | .. | .. | .. | .. | .. | .. | .. | 4 | .. |
| Lachrymal Obstruc: | 2 | .. | 1 | .. | 1 | .. | .. | .. | .. | .. |
| „ Abscess | 3 | .. | 1 | .. | 1 | .. | .. | .. | 1 | .. |
| Hordeolum .. .. | 1 | .. | .. | .. | .. | .. | .. | .. | 3 | .. |
| Strabismus .. .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Cyst of Eyelids .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Tumour .. .. | .. | .. | .. | .. | .. | .. | .. | .. | 6 | .. |

*Abstract No. 20—continued.*

| | 1870. | | | | | | | | 1869. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Bengal. | | Madras. | | Bombay. | | 1st Batt. 21st Regt. | | Bengal. | |
| Average Strength .. | 34,090 | | 9,936 | | 10,557 | | 797 | | 35,173 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| 3. Diseases of the Ear: | | | | | | | | | | |
| Infl: Mmbr: Tympani | 93 | .. | 20 | .. | 46 | .. | .. | .. | 147 | .. |
| Deafness .. .. | 42 | .. | 19 | .. | 15 | .. | 3 | .. | 65 | .. |
| Infl: external Meatus | 116 | .. | 23 | .. | 9 | .. | .. | .. | .. | .. |
| Abscess „ „ | .. | .. | 8 | .. | 2 | .. | .. | .. | .. | .. |
| Accumulation of Wax | 4 | .. | .. | .. | .. | .. | .. | .. | 2 | .. |
| Polypus .. .. | 3 | .. | 4 | .. | .. | .. | .. | .. | 1 | .. |
| 4. Diseases of the Nose: | | | | | | | | | | |
| Epistaxis .. .. | 27 | .. | 2 | .. | 3 | .. | 1 | .. | 17 | .. |
| Ozœna .. .. | 2 | .. | 2 | .. | .. | .. | .. | .. | 6 | .. |
| Polypus .. .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| 5. Circulatory Syst. | | | | | | | | | | |
| Pericarditis.. .. | 29 | 4 | 1 | .. | 6 | .. | .. | .. | 20 | 2 |
| Valve Dis: of Heart | 134 | 22 | 36 | 5 | 33 | 2 | 4 | 1 | 158 | 27 |
| Hypertrophy „ | 83 | 6 | 20 | 1 | 13 | 1 | .. | .. | 89 | 5 |
| Aneurism „ | .. | .. | 14 | .. | .. | .. | .. | .. | .. | .. |
| Palpitation „ | 224 | .. | 46 | .. | 77 | .. | 33 | .. | 147 | .. |
| Aneurism of Aorta.. | 32 | 17 | .. | 11 | 10 | 6 | .. | .. | 28 | 18 |
| Aneurism .. .. | .. | .. | .. | .. | 1 | .. | .. | .. | 6 | 1 |
| Phlebitis .. .. | 1 | .. | 2 | .. | 2 | .. | .. | .. | 3 | .. |
| Varicose Veins .. | 11 | .. | 13 | .. | 15 | .. | 1 | .. | 26 | .. |
| Adhrnt. Pericardium | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Dropsy of „ | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Endocarditis .. | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Dilatation of Heart | 3 | 1 | .. | 1 | .. | .. | .. | .. | .. | .. |
| Atrophy „ | 2 | .. | .. | .. | .. | .. | .. | .. | 4 | .. |
| Fatty Degen. „ | 4 | 5 | .. | .. | .. | .. | .. | .. | 4 | 2 |
| Rupture „ | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Angina Pectoris .. | 3 | .. | .. | .. | .. | .. | .. | .. | 3 | .. |
| Syncope .. .. | 1 | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Rupture of Aorta .. | .. | 1 | .. | .. | .. | .. | .. | .. | 2 | 2 |
| „ Vein .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| 6. Absorbent Syst. | | | | | | | | | | |
| Inflam: of Glands .. | 521 | .. | 243 | .. | 199 | .. | 25 | .. | 407 | .. |
| Suppuration „ .. | 88 | .. | 41 | .. | 26 | .. | .. | .. | 93 | .. |
| Hypertrophy „ | .. | .. | 2 | .. | 1 | .. | .. | .. | 5 | .. |
| 7. Diseases of Ductless Glands. | | | | | | | | | | |
| Goitre .. .. | .. | .. | .. | .. | .. | .. | .. | .. | 2 | .. |
| Infl: of Thyroid Gland | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Addison's Disease .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| 8. Respiratory Sys: | | | | | | | | | | |
| Laryngitis .. .. | 14 | .. | .. | .. | .. | .. | .. | .. | 9 | .. |
| Bronchitis .. .. | 1,582 | 5 | 369 | .. | 442 | 3 | 24 | .. | 1,347 | 12 |

Abstract No. 20—*continued.*

| | 1870. | | | | | | | | 1869. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Bengal. | | Madras. | | Bombay. | | 1st Batt. 21st Regt. | | Bengal. | |
| Average Strength.. | 34,090 | | 9,936 | | 10,557 | | 797 | | 35,173 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| Asthma .. .. | 6 | 1 | 10 | .. | 11 | .. | .. | .. | 15 | .. |
| Pneumonia.. .. | 149 | 46 | 21 | 4 | 21 | 2 | 1 | .. | 112 | 16 |
| Pleurisy .. .. | 128 | 2 | 35 | 2 | 27 | 2 | .. | .. | 154 | .. |
| Coryza .. .. | 9 | .. | 3 | .. | 2 | .. | .. | .. | 15 | .. |
| Aphonia .. .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Gangrene .. .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| Pulmonary extrava: | 2 | .. | 1 | .. | .. | .. | .. | .. | 2 | 3 |
| Œdema .. .. | .. | .. | 1 | .. | .. | .. | .. | .. | 6 | .. |
| Emphysema .. | 7 | .. | .. | .. | 1 | 1 | .. | .. | .. | .. |
| 9. Digestive Syst: | | | | | | | | | | |
| Tonsillitis .. .. | 617 | .. | 148 | .. | 155 | .. | 12 | .. | 534 | 1 |
| Gastritis .. .. | 10 | 4 | 3 | .. | 3 | .. | .. | .. | 15 | 2 |
| Dyspepsia .. .. | 1,271 | .. | 744 | .. | 334 | .. | 19 | .. | 1,504 | .. |
| Enteritis .. .. | 14 | 8 | 3 | 2 | 2 | 1 | .. | .. | 13 | 5 |
| Dysentery .. .. | 1,269 | 55 | 731 | 23 | 220 | 11 | 38 | 1 | 1,648 | 105 |
| Diarrhœa .. .. | 2,171 | 8 | 695 | .. | 807 | 5 | 66 | .. | 3,396 | 28 |
| Hernia .. .. | 24 | .. | .. | .. | 7 | 1 | .. | .. | 43 | .. |
| Colic .. .. | 177 | .. | 66 | .. | 59 | .. | 8 | .. | 283 | .. |
| Tænia Solium .. | 161 | .. | 38 | .. | 32 | .. | 2 | .. | 192 | .. |
| Ascaris Lumbricoides | .. | .. | 1 | .. | 5 | .. | 1 | .. | .. | .. |
| Constipation .. | 30 | .. | 20 | .. | 22 | .. | .. | .. | 69 | .. |
| Fistula in Ano .. | 32 | .. | 9 | .. | 9 | .. | 1 | .. | 36 | .. |
| Hæmorrhoids .. | 282 | .. | 95 | .. | 82 | .. | 6 | .. | 271 | .. |
| Hepatitis .. .. | 1,920 | 152 | 685 | 41 | 424 | 11 | 24 | 3 | 1,812 | 170 |
| Cirrhosis .. .. | .. | .. | 1 | 1 | 1 | .. | 1 | .. | 4 | 4 |
| Jaundice .. .. | 166 | 1 | 29 | .. | 62 | 2 | 2 | .. | 175 | 2 |
| Splenitis .. .. | 210 | 4 | 38 | .. | 26 | .. | 41 | .. | 139 | 1 |
| Peritonitis .. .. | 12 | 6 | .. | .. | 6 | 4 | .. | .. | 8 | 6 |
| Ascites .. .. | 3 | .. | .. | .. | 1 | .. | 1 | .. | 6 | 2 |
| Stomatitis .. .. | 13 | .. | 3 | .. | .. | .. | 1 | .. | 6 | .. |
| Thrush .. .. | 2 | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Abscess of Cheek .. | 3 | .. | 3 | .. | .. | .. | .. | .. | 2 | .. |
| Ranula .. .. | 2 | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Abscess of Antrum.. | .. | .. | 3 | .. | .. | .. | .. | .. | 1 | .. |
| Tumour of Jaw .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Caries of Jaw .. | 7 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| „ Teeth .. | 8 | .. | .. | .. | .. | .. | .. | .. | 5 | .. |
| Inflam: of Alveoli .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| Gum Boil .. .. | 32 | .. | 29 | .. | 9 | .. | .. | .. | 35 | .. |
| Glossitis .. .. | 3 | .. | .. | .. | 1 | .. | .. | .. | 1 | .. |
| Pharyngitis.. .. | 2 | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| Infla: of Sal'iv. Glands | 8 | .. | 2 | .. | .. | .. | .. | .. | 2 | .. |
| Stric: of Œsophagus | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| Ulcer of Stomach .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Hæmatemesis .. | 7 | .. | 2 | .. | 2 | .. | .. | .. | 11 | .. |
| Perfor: of Stomach | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. |
| Ulcer of „ | .. | .. | .. | .. | .. | .. | .. | .. | .. | 2 |
| Typhlitis .. .. | 3 | .. | 1 | .. | .. | .. | .. | .. | 1 | .. |
| Perfor: of Intestines | 3 | 2 | .. | .. | .. | .. | .. | .. | 1 | 1 |

Abstract No. 20—*continued.*

| | 1870. | | | | | | | | 1869. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Bengal. | | Madras. | | Bombay. | | 1st Batt. 21st Regt. | | Bengal. | |
| Average Strength .. | 34,090 | | 9,936 | | 10,557 | | 797 | | 35,173 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| Subperitoneal Abscss. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 2 |
| Fæcal Abscess .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Melæna .. .. | 1 | .. | .. | .. | 1 | .. | .. | .. | 1 | 1 |
| Stricture of Rectum | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Ulcer of „ | 4 | .. | .. | .. | .. | .. | .. | .. | 8 | .. |
| „ of Anus .. | 9 | .. | 3 | .. | .. | .. | .. | .. | .. | .. |
| Prolapsus Ani .. | 4 | .. | 1 | .. | 2 | .. | .. | .. | 7 | .. |
| Condyloma „ .. | 6 | .. | 7 | .. | .. | .. | .. | .. | 13 | .. |
| Cirrhosis of Liver .. | 5 | 3 | .. | .. | .. | .. | .. | .. | .. | .. |
| Hydatids of „ .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Tumours .. .. | 2 | .. | 2 | .. | .. | .. | .. | .. | 1 | .. |
| Worms .. .. | .. | .. | .. | .. | .. | .. | .. | .. | 4 | .. |
| 10. Urinary Syst. | | | | | | | | | | |
| Bright's Disease .. | 88 | 11 | 3 | .. | 11 | 1 | .. | .. | 35 | 11 |
| Nephritis .. .. | 17 | 3 | 2 | .. | .. | .. | .. | .. | 25 | 2 |
| Gonorrhœa .. .. | 3,015 | .. | 617 | .. | 759 | .. | 30 | .. | 3,083 | .. |
| Phimosis, &c. .. | 26 | .. | 7 | .. | 6 | .. | 1 | .. | 38 | .. |
| Bubo .. .. | 21 | .. | 52 | .. | 13 | .. | 1 | .. | 126 | .. |
| Epididymitis (Gon:) | 137 | .. | 23 | .. | 26 | .. | .. | .. | 153 | .. |
| Stricture of Urethra | 110 | 1 | 21 | .. | 40 | .. | 2 | .. | 131 | .. |
| Urinary Fistula .. | .. | .. | .. | .. | 8 | .. | .. | .. | 5 | .. |
| Diuresis .. .. | 2 | .. | .. | .. | .. | .. | .. | .. | 8 | .. |
| Cystitis .. .. | 16 | 1 | 6 | .. | 7 | .. | .. | .. | 13 | 1 |
| Calculus .. .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Hæmaturia .. .. | 3 | .. | 3 | .. | 1 | .. | .. | .. | 11 | .. |
| Incontinence of Urine | 18 | .. | 3 | .. | 2 | .. | 1 | .. | 10 | .. |
| Retention of „ | 1 | .. | .. | .. | .. | .. | .. | .. | 3 | .. |
| Inflam: of Prostate | 4 | .. | .. | .. | .. | .. | .. | .. | 2 | .. |
| Prostatic Abscess .. | .. | .. | 3 | 1 | .. | .. | .. | .. | .. | .. |
| Enlarged Prostate .. | .. | .. | 1 | .. | 1 | .. | .. | .. | .. | .. |
| Urinary Abscess .. | 11 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Extravasatn. of Urine | .. | 2 | .. | .. | .. | .. | .. | .. | 2 | 2 |
| Abscess in Perineum | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| 11. Generative Sys. | | | | | | | | | | |
| Varicocele .. .. | 13 | .. | 3 | .. | 4 | .. | .. | .. | 5 | .. |
| Hydrocele .. .. | 17 | .. | 6 | .. | 12 | .. | 4 | .. | 21 | .. |
| Orchitis .. .. | 511 | .. | 148 | .. | 122 | .. | 6 | .. | 488 | .. |
| Inflamma: of Penis | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Phimosis .. .. | .. | .. | .. | .. | 4 | .. | .. | .. | .. | .. |
| Œdema of Scrotum | 2 | .. | .. | .. | 1 | .. | .. | .. | 5 | .. |
| Abscess of Testicle.. | 4 | .. | .. | .. | .. | .. | .. | .. | 3 | .. |
| Protrusion of Tubuli | .. | .. | .. | .. | .. | .. | .. | .. | 3 | .. |
| Atrophy of Testicle | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Neuralgia of Testicle | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Spermatorrhœa .. | 1 | .. | 2 | .. | .. | .. | .. | .. | 4 | .. |
| Abrasion of Prepuce | .. | .. | .. | .. | .. | .. | .. | .. | 2 | .. |
| 12. Organs of Loco. | | | | | | | | | | |
| Ostitis .. .. | 54 | .. | 8 | .. | 13 | .. | .. | .. | 44 | .. |

Abstract No. 20—*continued.*

| | 1870. | | | | | | | | 69. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Bengal. | | Madras. | | Bombay. | | 1st Batt. 21st Regt. | | Bengal. | |
| Average Strength .. | 34,090 | | 9,936 | | 10,557 | | 797 | | 35,173 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| Caries .. .. | 5 | .. | 3 | .. | .. | .. | .. | .. | 4 | .. |
| Necrosis .. .. | 2 | .. | 4 | .. | .. | .. | .. | .. | 9 | .. |
| Synovitis .. .. | 65 | .. | 29 | .. | 22 | .. | .. | .. | 86 | .. |
| Dropsy of Joint .. | 5 | .. | 1 | .. | 1 | .. | .. | .. | 3 | .. |
| Nodes .. .. | 4 | .. | .. | .. | .. | .. | .. | .. | 2 | .. |
| Tumours .. .. | 5 | .. | 3 | .. | .. | .. | .. | .. | 8 | .. |
| Contraction.. .. | 9 | .. | 1 | .. | .. | .. | .. | .. | 9 | .. |
| Loose Cartilage .. | .. | .. | 2 | .. | .. | .. | .. | .. | 1 | .. |
| Psoas Abscess .. | 3 | .. | .. | .. | .. | .. | .. | .. | 7 | 1 |
| Lateral Curvature .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| Atrophy of Muscle | 3 | .. | 1 | .. | 1 | .. | .. | .. | 2 | .. |
| Enlrgd: Bursa Patellæ | 5 | .. | 3 | .. | 1 | .. | .. | .. | 6 | .. |
| Bunion .. .. | 2 | .. | .. | .. | 2 | .. | .. | .. | 1 | .. |
| Abscess of Muscle .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. |
| Lumbar Abscess .. | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. |
| Gangrene of Leg .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Ganglion .. .. | 3 | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Curvature of Spine | 2 | .. | 3 | .. | .. | .. | .. | .. | .. | .. |
| Club-foot .. .. | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 13. Diseases of Cellular Tissue. | | | | | | | | | | |
| Inflam: of Cel: Tissue | 74 | .. | 26 | .. | 30 | .. | .. | .. | 112 | .. |
| Abscess „ „ | 311 | 4 | 129 | .. | 133 | .. | 5 | .. | 250 | 1 |
| Obesity .. .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| Guinea Worm .. | 4 | .. | 18 | .. | 14 | .. | .. | .. | 7 | .. |
| Cartila: Tumour .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Iliac Abscess .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| 14. Cutaneous Syst: | | | | | | | | | | |
| Urticaria .. .. | 11 | .. | 11 | .. | 8 | .. | .. | .. | 16 | .. |
| Lichen .. .. | 6 | .. | 7 | .. | 9 | .. | .. | .. | 10 | .. |
| Psoriasis .. .. | 42 | .. | 8 | .. | 8 | .. | 1 | .. | 39 | .. |
| Herpes .. .. | 71 | .. | 27 | .. | 43 | .. | 5 | .. | 69 | .. |
| Eczema .. .. | 106 | .. | 39 | .. | 56 | .. | 4 | .. | 142 | .. |
| Impetigo .. .. | 8 | .. | 1 | .. | 2 | .. | .. | .. | 2 | .. |
| Ulcer .. .. | 860 | .. | 423 | .. | 283 | .. | 5 | .. | 1,103 | .. |
| Boil .. .. | 573 | .. | 294 | .. | 210 | .. | 30 | .. | 830 | .. |
| Carbuncle .. .. | 18 | 1 | 6 | .. | 2 | .. | 1 | .. | 11 | .. |
| Whitlow .. .. | 148 | .. | 38 | .. | 44 | .. | 1 | .. | 145 | .. |
| Itch .. .. .. | 47 | .. | 34 | .. | 28 | .. | .. | .. | 45 | .. |
| Warts .. .. | 80 | .. | 18 | .. | 12 | .. | .. | .. | 72 | .. |
| Ichthyosis .. .. | .. | .. | .. | .. | .. | .. | 3 | .. | 3 | .. |
| Erythema .. .. | 11 | .. | 3 | .. | 10 | .. | .. | .. | 11 | .. |
| Intertrigo .. .. | 5 | .. | 2 | .. | .. | .. | .. | .. | 6 | .. |
| Roseola .. .. | 1 | .. | 1 | .. | 1 | .. | .. | .. | 1 | .. |
| Pemphigus .. .. | 3 | .. | 2 | .. | .. | .. | .. | .. | 1 | .. |
| Prurigo .. .. | 6 | .. | 1 | .. | 1 | .. | .. | .. | 2 | .. |
| Rupia .. .. | 9 | .. | 1 | .. | .. | .. | .. | .. | 3 | .. |
| Ecthyma .. .. | 3 | .. | 6 | .. | .. | .. | .. | .. | 9 | .. |
| Acne .. .. | 5 | .. | 8 | .. | 2 | .. | .. | .. | 8 | .. |

Abstract No. 20—*continued.*

| | 1870. | | | | | | | | 1869. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Bengal. | | Madras. | | Bombay. | | 1st Batt. 21st Regt. | | Bengal. | |
| Average Strength .. | 34,090 | | 9,936 | | 10,557 | | 797 | | 35,173 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| Abscess .. .. | .. | .. | .. | .. | .. | .. | .. | .. | 157 | .. |
| Corn .. .. | 5 | .. | 3 | .. | 2 | .. | .. | .. | 4 | .. |
| Tumours .. .. | 14 | .. | 8 | .. | 8 | .. | .. | .. | 9 | .. |
| Ingrown Nail .. | 37 | .. | 13 | .. | 13 | .. | .. | .. | 21 | .. |
| Tinea .. .. | 38 | .. | 17 | .. | 6 | .. | .. | .. | 27 | .. |
| Irritation by Insects, &c. .. | 16 | .. | 1 | .. | 1 | .. | .. | .. | 11 | .. |
| Cheloid .. .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| Strophulus Candidus | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Leucoderma .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Ephidrosis .. .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. |
| Miliaria .. .. | 4 | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Gangrene of Leg .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Delhi Boil .. .. | 48 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Pruritus .. .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| III. *Conditions, &c.* | | | | | | | | | | |
| General Debility .. | 484 | 4 | 524 | .. | 122 | .. | 14 | .. | 465 | 5 |
| IV. *Poisons.* | | | | | | | | | | |
| Delirium Tremens .. | 193 | 8 | 78 | 3 | 79 | 4 | 14 | .. | 242 | 22 |
| Alcohol .. .. | 5 | 2 | 25 | 1 | 40 | .. | .. | .. | 6 | 1 |
| Opium .. .. | .. | .. | .. | .. | .. | .. | .. | .. | 3 | .. |
| Irritation from Larvæ in Throat.. .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | 1 |
| Fungi .. .. | .. | .. | .. | .. | .. | .. | .. | .. | 2 | .. |
| Snake-bite .. .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Salivatn. by Mercury | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Scorpion Wound .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Indian Hemp .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Vegetable .. .. | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Dead animal matter | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| V. *Injuries.* | | | | | | | | | | |
| 2. Accidental: | | | | | | | | | | |
| Burns and Scalds .. | 29 | 1 | 12 | .. | 8 | .. | 2 | .. | 55 | .. |
| Lightning Stroke .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | 1 |
| Multiple Injury .. | 6 | 3 | .. | .. | 1 | .. | .. | .. | 17 | 6 |
| Asphx: by Drowning | .. | 14 | 2 | 10 | .. | 6 | .. | .. | .. | 8 |
| Contusion .. .. | 1,484 | .. | 595 | .. | 398 | .. | 76 | .. | 1,573 | .. |
| Concuss: of the Brain | 11 | 6 | 5 | 2 | 3 | 1 | .. | .. | 5 | 1 |
| Fracture .. .. | 115 | 4 | 63 | 3 | 23 | .. | 1 | .. | 152 | 4 |
| Wounds .. .. | 363 | 1 | 204 | .. | 121 | .. | 7 | .. | 364 | .. |
| „ from Gunshot | 13 | 1 | 1 | .. | .. | .. | 1 | .. | 7 | 2 |
| Sprain .. .. | 737 | .. | 238 | .. | 179 | .. | 14 | .. | 814 | .. |

Abstract No. 20—*continued.*

| | 1870. | | | | | | | | 1869. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Bengal. | | Madras. | | Bombay. | | 1st Batt. 21st Regt. | | Bengal. | |
| Average Strength .. | 34,090 | | 9,936 | | 10,557 | | 797 | | 35,173 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| Dislocation .. .. | 36 | .. | 15 | .. | 4 | .. | 1 | .. | 43 | .. |
| Blisters of the Feet | 42 | .. | 12 | .. | 18 | .. | .. | .. | 75 | .. |
| Asphx: from plugging air passages .. | .. | 3 | .. | .. | .. | 1 | .. | .. | 1 | 2 |
| Rupture of Muscles.. | 3 | .. | 2 | .. | 2 | .. | .. | .. | .. | .. |
| „ Spleen .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Chm. Injury to Eyelid | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Dog-bite .. .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Horse-bite .. .. | .. | .. | 3 | .. | .. | .. | .. | .. | .. | .. |
| For: body in Pharynx | 1 | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Concussion of Spine | .. | 1 | .. | .. | 1 | .. | .. | .. | .. | .. |
| 3. Homicidal: | | | | | | | | | | |
| Wound .. .. | .. | .. | .. | .. | 1 | .. | .. | .. | 1 | 1 |
| Gun Shot .. .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | 2 |
| Concussion of Brain | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 |
| Dislocation .. .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| 4. Self-inflicted: | | | | | | | | | | |
| Poison .. .. | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | 1 |
| Concussion of Brain | .. | .. | .. | .. | .. | .. | .. | .. | 1 | 1 |
| Cut Throat .. .. | 4 | 1 | .. | .. | 2 | 2 | .. | .. | 7 | 2 |
| Gun Shot .. .. | 3 | 8 | .. | 2 | 1 | .. | .. | .. | 5 | 12 |
| Wound (not specified) | 1 | .. | 1 | .. | .. | .. | .. | .. | 1 | .. |
| Asphx: by drowning | .. | 4 | .. | 2 | .. | .. | .. | .. | 1 | 6 |
| „ hanging .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | 3 |
| Fracture of Skull .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 |
| Fracture .. .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| 5. Judicial: | | | | | | | | | | |
| Asphyxia by hanging | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 |
| VI. *Surgical Operations.* | | | | | | | | | | |
| Fistula in Ano .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| Amputn: of Fingers | 3 | .. | 1 | .. | .. | .. | .. | .. | 4 | .. |
| „ of Thigh .. | 2 | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| „ of Leg .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| „ of Arm .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Extr: of Forgn. Body | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Paracentesis .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Excision of Tumour | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Strangulated Hernia | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Operatn: for Phymosis | 1 | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| No apprble. Disease | 21 | .. | 9 | .. | 2 | .. | .. | .. | 38 | .. |
| Total .. .. | .. | 757 | 12,728 | 209 | 16,220 | 170 | 3,173 | 13 | 59,390 | 1517 |

Abstract No. 20—*continued.*

CAUSES of the Deaths of the Invalids.

| | 1870. | | | | 1869. |
|---|---|---|---|---|---|
| | Bengal. | Madras. | Bombay. | 1st Batt. 21st Rgt. | Bengal. |
| Ague | 1 | .. | .. | .. | .. |
| Remittent Fever | .. | 1 | .. | .. | .. |
| Simple Cholera | .. | .. | .. | .. | 1 |
| Chronic Rheumatism | 1 | .. | .. | .. | .. |
| Secondary Syphilis | 4 | .. | .. | .. | .. |
| Cancer | 1 | 1 | .. | .. | .. |
| Scrofula | 1 | .. | .. | .. | .. |
| Phthisis Pulmonalis | 11 | 1 | 13 | 2 | 22 |
| Diabetes | 1 | .. | .. | .. | .. |
| Apoplexy | .. | .. | .. | .. | 1 |
| Paralysis | 2 | .. | 1 | .. | 3 |
| Epilepsy | 1 | .. | .. | .. | .. |
| Mania | .. | .. | 1 | .. | .. |
| Valve Disease of Heart | 2 | 1 | .. | .. | 3 |
| Aneurism of Aorta | 1 | 1 | 2 | .. | .. |
| Laryngitis | 1 | .. | .. | .. | .. |
| Bronchitis | 1 | .. | .. | .. | 2 |
| Asthma | .. | 1 | .. | .. | .. |
| Pneumonia | 6 | 1 | .. | .. | .. |
| Pleurisy | 1 | 1 | .. | .. | .. |
| Empyema | 1 | .. | .. | .. | .. |
| Dysentery | 10 | 11 | 6 | 2 | 6 |
| Diarrhœa | 1 | 1 | .. | .. | 3 |
| Hepatitis | 1 | 2 | 2 | .. | 6 |
| Ascites | 1 | .. | .. | .. | .. |
| Abscess of Liver | 6 | 4 | 2 | .. | .. |
| Intus-Susceptio | 1 | .. | .. | .. | .. |
| Bright's Disease | 2 | .. | .. | .. | 2 |
| Lumbar Abscess | .. | .. | 1 | 1 | .. |
| General Debility | .. | .. | .. | .. | 1 |
| Total | 60 | 26 | 28 | 5 | 50 |

APPENDIX No. XXI—*continued.*

ABSTRACT No. 21, showing the disabilities of the Invalids sent home from each of the Presidencies in 1870, and of the Invalids from India finally discharged the Service at Netley in that year.

| | Invalids sent Home from | | | | Discharged at Netley. |
|---|---|---|---|---|---|
| | Bengal. | Madras. | 1st Batt. 21st Foot | Bombay. | |
| Strength .. .. .. .. | 34,090 | 9,936 | 797 | 10,557 | 55,380 |
| *I. General Diseases.* | | | | | |
| Sub-division A: | | | | | |
| Simple continued Fever .. .. | 2 | 1 | .. | .. | .. |
| Ague .. .. .. .. | 99 | 8 | 89 | 21 | 50 |
| Remittent Fever .. .. .. | 15 | 4 | .. | .. | .. |
| Sub-division B: | | | | | |
| Acute Rheumatism .. .. | 4 | .. | 1 | 4 | 1 |
| Chronic .. .. .. | 99 | 24 | .. | 13 | 32 |
| Muscular .. .. .. .. | 6 | .. | .. | .. | 4 |
| Chronic Osteo-Arthitis .. .. | 1 | .. | .. | .. | 1 |
| Gout .. .. .. .. | 1 | .. | .. | .. | .. |
| Primary Syphilis .. .. .. | 1 | 1 | .. | .. | 7 |
| Secondary „ .. .. .. | 95 | 53 | .. | 19 | 96 |
| Cancer .. .. .. .. | 2 | .. | .. | 1 | .. |
| Scrofula .. .. .. .. | 5 | 2 | 1 | 4 | 18 |
| Morbus Coxarius .. .. .. | 1 | .. | .. | .. | .. |
| Phthisis Pulmonalis .. .. | 117 | 52 | 1 | 53 | 225 |
| Hæmoptysis (Tub.) .. .. | 2 | .. | .. | .. | 1 |
| Purpura .. .. .. .. | 1 | .. | .. | .. | .. |
| Scurvy .. .. .. .. | 1 | .. | .. | .. | .. |
| Anæmia .. .. .. .. | 134 | 20 | 4 | 22 | 50 |
| General Dropsy .. .. .. | 1 | .. | .. | 1 | .. |
| Diabetes .. .. .. .. | 1 | 1 | .. | .. | .. |
| Lupus .. .. .. .. | .. | .. | .. | .. | 1 |
| True Leprosy .. .. .. | .. | .. | .. | 3 | 1 |
| *II. Local Diseases.* | | | | | |
| 1. Diseases of the Nervous Syst.: | | | | | |
| Encephalitis .. .. .. | 2 | 1 | .. | 1 | .. |
| Meningitis .. .. .. .. | 2 | 1 | .. | .. | .. |
| Apoplexy .. .. .. .. | 1 | 1 | .. | .. | .. |
| Sunstroke .. .. .. .. | 6 | .. | .. | .. | 5 |
| Paralysis .. .. .. .. | 17 | 5 | .. | 5 | 27 |
| Locomotor Ataxy .. .. .. | .. | 2 | .. | 1 | 3 |
| Epilepsy .. .. .. .. | 26 | 3 | .. | 2 | 25 |
| Chorea .. .. .. .. | .. | .. | .. | .. | 1 |
| Neuralgia .. .. .. .. | 6 | 5 | .. | 3 | 7 |
| Mania .. .. .. .. | 13 | 8 | .. | 2 | .. |
| Dementia .. .. .. .. | 9 | 6 | 2 | 11 | .. |
| Headache .. .. .. .. | 1 | .. | .. | .. | 1 |
| Stammering .. .. .. | .. | .. | .. | 1 | .. |
| 2. Diseases of the Eye: | | | | | |
| Conjunctivitis .. .. .. | 4 | .. | .. | 6 | 4 |
| Tarsal Opthalmia .. .. .. | 1 | 2 | .. | .. | .. |
| Total Disorganization of Eye .. | 1 | .. | .. | .. | .. |
| Short Sight.. .. .. .. | 3 | .. | .. | .. | 7 |

Abstract No. 21—*continued.*

| | Invalids sent Home from | | | | Discharged at Netley. |
|---|---|---|---|---|---|
| | Bengal. | Madras. | 1st Batt. 21st Foot | Bombay. | |
| Strength .. .. .. .. | 34,090 | 9,936 | 797 | 10,557 | 55,380 |
| Keratitis .. .. .. .. | 1 | .. | .. | .. | .. |
| Hemeralopia .. .. .. | 1 | .. | .. | .. | 1 |
| Opacity of Cornea .. .. .. | 2 | .. | .. | .. | 3 |
| Impaired Vision .. .. .. | 7 | 1 | .. | 1 | 4 |
| Iritis .. .. .. .. | 2 | .. | .. | .. | 3 |
| Amaurosis .. .. .. .. | 1 | 1 | .. | .. | 4 |
| Cataract .. .. .. .. | .. | .. | .. | 1 | .. |
| Retinitis .. .. .. .. | .. | .. | .. | .. | 1 |
| 3. Diseases of the Ear : | | | | | |
| Inflam. Membr. Tympani .. .. | 3 | .. | .. | .. | .. |
| Deafness .. .. .. .. | 11 | 5 | .. | 1 | 10 |
| 4. Diseases of the Nose : | | | | | |
| Ozæna .. .. .. .. | .. | .. | .. | .. | 1 |
| 5. Circulatory System :— | | | | | |
| Pericarditis .. .. .. .. | 2 | .. | .. | .. | .. |
| Adherent Pericardium .. .. | 1 | .. | .. | .. | .. |
| Valve Disease of Heart .. .. | 57 | 16 | 2 | 17 | 86 |
| Hypertrophy „ .. .. | 43 | 18 | .. | 5 | 46 |
| Dilatation „ .. .. | .. | .. | .. | .. | 16 |
| Angina Pectoris .. .. .. | .. | .. | .. | .. | 1 |
| Palpitation of Heart .. .. | 43 | 5 | 3 | 8 | 44 |
| Aneurism of Aorta .. .. .. | 3 | .. | .. | 3 | 3 |
| Aneurism .. .. .. .. | 4 | 5 | .. | .. | 2 |
| Phlebitis .. .. .. .. | 1 | .. | .. | .. | 1 |
| Varicose Veins .. .. .. | 12 | 1 | .. | 3 | 12 |
| 6. Absorbent System : | | | | | |
| Inflammation of Glands .. .. | 2 | .. | .. | .. | .. |
| Suppuration .. .. .. | .. | .. | .. | .. | 2 |
| 8. Respiratory System : | | | | | |
| Laryngitis .. .. .. .. | 2 | 1 | .. | .. | .. |
| Bronchitis .. .. .. .. | 31 | 17 | 1 | 10 | 13 |
| Asthma .. .. .. .. | 2 | 3 | .. | 4 | 8 |
| Emphysema .. .. .. | 4 | .. | .. | .. | .. |
| Pneumonia .. .. .. .. | 3 | 1 | .. | 1 | 6 |
| Pleurisy .. .. .. .. | 5 | .. | .. | .. | 3 |
| Empyema .. .. .. .. | .. | .. | .. | .. | 1 |
| Aphonia .. .. .. .. | 1 | .. | .. | .. | .. |
| Perforation of Palate .. .. | .. | .. | .. | .. | 1 |
| 9. Digestive System :— | | | | | |
| Dyspepsia .. .. .. .. | 15 | 9 | .. | 1 | 5 |
| Dysentery .. .. .. .. | 67 | 70 | 2 | 11 | 62 |
| Diarrhœa .. .. .. .. | 15 | 9 | .. | 5 | 12 |
| Hernia .. .. .. .. | 12 | 4 | 1 | 5 | 19 |
| Fistula in Ano .. .. .. | 4 | 2 | .. | 2 | 2 |
| Abscess of Anus .. .. .. | .. | .. | .. | .. | 1 |
| Stricture of Rectum .. .. | 1 | .. | .. | .. | .. |
| Prolapsus Ani .. .. .. | 1 | .. | .. | .. | .. |
| Hæmorrhoids .. .. .. | 3 | 2 | .. | .. | 3 |
| Hepatitis .. .. .. .. | 249 | 131 | 5 | 49 | 82 |
| Fatty Liver .. .. .. .. | .. | .. | .. | .. | 1 |
| Splenitis .. .. .. .. | 24 | 5 | 12 | 1 | 16 |
| Congestion of Spleen .. .. | 4 | .. | .. | 1 | .. |
| Ascites .. .. .. .. | .. | .. | .. | 1 | .. |

Abstract No. 21—*continued.*

| | Invalids sent Home from | | | | Discharged at Netley. |
|---|---|---|---|---|---|
| | Bengal. | Madras. | 1st Batt. 21st Foot | Bombay. | |
| Strength .. .. .. .. | 34,090 | 9,936 | 797 | 10,557 | 55,380 |
| 10. Urinary System :— | | | | | |
| Cystitis .. .. .. .. | .. | .. | .. | .. | 11 |
| Incontinence of Urine .. .. | 1 | .. | 1 | .. | |
| Urinary Abscess .. .. .. | 1 | .. | .. | .. | .. |
| Bright's Disease .. .. .. | 11 | 1 | .. | 1 | 8 |
| Bubo .. .. .. .. | .. | 1 | .. | .. | .. |
| Stricture of Urethra .. .. | 11 | .. | .. | 3 | 11 |
| Urinary Fistula .. .. .. | .. | .. | .. | 2 | 2 |
| Hypospadic Fissure .. .. | .. | .. | .. | .. | 2 |
| 11. Generative System : | | | | | |
| Varicocele .. .. .. .. | 1 | .. | .. | 2 | 2 |
| Hydrocele .. .. .. .. | 2 | 1 | .. | .. | 2 |
| Orchitis .. .. .. .. | 1 | 3 | .. | 2 | 9 |
| Atrophy of Testicle .. .. | 1 | .. | .. | .. | .. |
| Protrusion of Tubuli .. .. | .. | .. | .. | .. | 1 |
| 12. Organs of Locomotion : | | | | | |
| Ostitis .. .. .. .. | 1 | 1 | .. | 2 | .. |
| Caries .. .. .. .. | 2 | 1 | .. | .. | 4 |
| Necrosis .. .. .. .. | .. | 2 | .. | .. | 3 |
| Acute Synovitis .. .. .. | 4 | 6 | .. | 1 | 5 |
| Dropsy of Joint .. .. .. | 1 | .. | .. | .. | .. |
| Deformity .. .. .. .. | .. | 1 | .. | .. | .. |
| Knock-knee.. .. .. .. | .. | .. | .. | .. | 1 |
| Lumbar Abscess .. .. .. | 1 | .. | .. | .. | 1 |
| Curvature of Spine.. .. .. | .. | 1 | .. | .. | 3 |
| Deformity of Sternum .. .. | .. | .. | .. | .. | 1 |
| Atrophy of Muscles .. .. | 1 | .. | .. | 1 | 1 |
| Deformity of Toe .. .. .. | .. | .. | .. | .. | 1 |
| Enlarged Bursa Patellæ .. .. | .. | .. | .. | .. | 2 |
| Talipes equinus Valgus .. .. | .. | .. | .. | .. | 2 |
| Ulceration of Cartilage .. .. | 1 | .. | .. | 1 | 2 |
| Contraction.. .. .. .. | 7 | 1 | .. | .. | 7 |
| Osseous Tumour .. .. .. | 1 | .. | .. | .. | .. |
| 13. Diseases of Cellular Tissue : | | | | | |
| Inflammation of Cellular Tissue .. | 1 | .. | .. | 1 | 6 |
| 14. Cutaneous System : | | | | | |
| Eczema .. .. .. .. | 1 | .. | .. | .. | 1 |
| Ulcer .. .. .. .. | 12 | 9 | .. | 4 | 17 |
| Whitlow .. .. .. .. | .. | 1 | .. | 1 | 2 |
| Prurigo .. .. .. .. | 1 | .. | .. | .. | .. |
| Tinea .. .. .. .. | 1 | .. | .. | .. | .. |
| Acne .. .. .. .. | .. | .. | .. | .. | 1 |
| Delhi Boil .. .. .. .. | 2 | .. | .. | .. | 1 |
| III. *Conditions, &c.* | | | | | |
| General Debility .. .. .. | 285 | 113 | 46 | 31 | 110 |
| V. *Injuries.* | | | | | |
| 2. Accidental : | | | | | |
| Contusion .. .. .. .. | 4 | 2 | .. | .. | 2 |
| Concussion of the Brain .. .. | .. | .. | .. | 2 | 1 |
| Fracture .. .. .. .. | 11 | 2 | .. | 1 | 14 |

Abstract No. 21—*continued.*

| | Invalids sent Home from | | | | Discharged at Netley. |
|---|---|---|---|---|---|
| | Bengal. | Madras. | 1st Batt. 21st Foot | Bombay. | |
| Strength .. .. .. .. | 34,090 | 9,936 | 797 | 10,557 | 55,380 |
| Wounds .. .. .. .. | .. | 2 | .. | 1 | 3 |
| „ from Gunshot .. .. | 1 | .. | .. | .. | 1 |
| Sprain .. .. .. .. | 3 | .. | .. | 1 | 1 |
| Dislocation .. .. .. .. | .. | 2 | .. | 1 | 3 |
| Loss of Thumb by explosion .. | .. | .. | .. | .. | 1 |
| 8. Homicidal: | | | | | |
| Wound .. .. .. .. | 1 | .. | .. | .. | .. |
| VI. *Surgical Operations.* | | | | | |
| Amputation of Leg .. .. | 2 | .. | .. | .. | .. |
| „ Arm .. .. | .. | .. | .. | .. | 1 |
| „ Finger .. .. | .. | .. | .. | .. | 4 |
| Excision of Elbow .. .. .. | .. | .. | .. | .. | 1 |
| Resection of Finger Joint .. .. | .. | .. | .. | .. | 1 |
| Iridectomy .. .. .. .. | .. | .. | .. | .. | 1 |
| Extraction of Lens .. .. .. | .. | .. | .. | .. | 1 |
| Operation for Urethral Fistula .. | .. | .. | .. | .. | 1 |
| Total .. .. | 1,692 | 656 | 171 | 361 | 1,289 |

APPENDIX No. XXI—*continued.*

ABSTRACT No. 22, showing the Ages of the Troops serving in Bengal, and the Deaths at each Age, during the Year 1870.

| Corps. | Under 20. | | 20 and under 25. | | 25 and under 30. | | 30 and under 35. | | 35 and under 40. | | 40 and upwards. | | Total. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. |
| 4th Hussars .. .. .. | 23 | .. | 138 | 3 | 150 | 2 | 93 | 4 | 29 | 1 | 2 | 1 | 485 | 11 |
| 5th Lancers.. .. .. .. | 16 | 1 | 48 | 2 | 175 | 1 | 180 | 7 | 23 | 1 | 5 | 1 | 447 | 13 |
| 11th Hussars .. .. .. | 3 | .. | 112 | .. | 126 | .. | 163 | 2 | 18 | .. | 7 | .. | 424 | 2 |
| 20th „ .. .. .. | .. | .. | 27 | .. | 124 | 1 | 230 | 6 | 51 | 1 | 11 | .. | 443 | 8 |
| 21st „ .. .. .. | 8 | .. | 64 | 1 | 172 | .. | 137 | 5 | 39 | 1 | 5 | .. | 425 | 7 |
| A Brigade, R.H.A... .. .. | 7 | .. | 180 | 4 | 197 | 5 | 194 | 9 | 62 | 4 | 9 | 1 | 649 | 23 |
| F, C „ „ .. .. .. | .. | 1 | 19 | 1 | 28 | .. | 65 | 1 | 12 | 1 | .. | .. | 124 | 4 |
| F „ „ .. .. .. | 9 | .. | 190 | 2 | 282 | 3 | 226 | 7 | 88 | 2 | 5 | .. | 800 | 14 |
| 8th „ R.A. .. .. .. | 20 | .. | 230 | 8 | 348 | 5 | 214 | 12 | 174 | 2 | 25 | .. | 1,011 | 27 |
| 16th „ „ .. .. .. | 28 | .. | 249 | 3 | 354 | 16 | 223 | 10 | 80 | 5 | 16 | .. | 950 | 34 |
| 19th „ „ .. .. .. | 29 | .. | 227 | 6 | 383 | 8 | 210 | 4 | 92 | 4 | 25 | 8 | 966 | 25 |
| 22nd „ „ .. .. .. | 5 | .. | 106 | 3 | 197 | 4 | 158 | 2 | 73 | 2 | 13 | .. | 552 | 11 |
| 24th „ „ .. .. .. | 1 | .. | 108 | 1 | 139 | 1 | 104 | 4 | 48 | 1 | 10 | .. | 410 | 7 |
| 25th „ „ .. .. .. | 11 | .. | 65 | 3 | 108 | 1 | 113 | 5 | 46 | 3 | 11 | 1 | 354 | 13 |
| 1st Battalion, 3rd Foot .. .. | 7 | .. | 628 | 2 | 298 | .. | 166 | 2 | 60 | 1 | 4 | .. | 863 | 5 |
| 1st „ 5th „ .. .. | 19 | 1 | 352 | 13 | 306 | 13 | 146 | 6 | 60 | 3 | 6 | .. | 889 | 36 |
| 1st „ 6th „ .. .. | 16 | .. | 404 | 12 | 263 | 5 | 113 | 1 | 43 | 2 | 7 | .. | 846 | 20 |
| 1st „ 11th „ .. .. | 261 | .. | 238 | 3 | 182 | 6 | 99 | 7 | 22 | 6 | .. | .. | 802 | 22 |
| 2nd „ 12th „ .. .. | 29 | .. | 214 | 7 | 283 | 15 | 126 | 6 | 41 | 2 | 4 | 1 | 697 | 31 |
| 1st „ 14th „ .. .. | 143 | .. | 260 | 5 | 190 | 2 | 179 | 4 | 70 | 3 | 4 | .. | 846 | 14 |
| 1st „ 19th „ .. .. | 23 | 2 | 186 | 2 | 215 | 3 | 265 | 4 | 90 | 2 | 10 | .. | 789 | 13 |

Abstract No. 22—*continued.*

| Corps. | Under 20. | | 20 and under 25. | | 25 and under 30. | | 30 and under 35. | | 35 and under 40. | | 40 and upwards. | | Total. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. | Strength on 1st Jan. | Died. |
| 2nd Battalion, 19th Foot .. .. | 36 | .. | 197 | .. | 378 | 6 | 121 | 2 | 59 | 4 | 6 | .. | 797 | 12 |
| 2nd „ 25th „ .. .. | 30 | .. | 301 | 3 | 434 | 5 | 93 | 3 | 41 | 2 | 2 | .. | 901 | 13 |
| 26th Foot .. .. .. .. | 30 | .. | 321 | 6 | 242 | 10 | 169 | 6 | 64 | 3 | 11 | 1 | 837 | 26 |
| 36th „ .. .. .. .. | 49 | 2 | 209 | 5 | 149 | 5 | 173 | 3 | 70 | 2 | 10 | .. | 660 | 17 |
| 37th „ .. .. .. .. | 2 | .. | 108 | 2 | 153 | 4 | 177 | 3 | 19 | 1 | 7 | 1 | 466 | 11 |
| 38th „ .. .. .. .. | 75 | .. | 172 | 5 | 276 | 7 | 245 | 13 | 78 | 4 | 5 | .. | 851 | 29 |
| 39th „ .. .. .. .. | 347 | 1 | 164 | 7 | 229 | .. | 40 | 11 | 36 | 5 | 9 | 2 | 825 | 26 |
| 41st „ .. .. .. .. | 35 | .. | 238 | 3 | 270 | 4 | 209 | 5 | 70 | 1 | 11 | .. | 833 | 13 |
| 55th „ .. .. .. .. | 13 | .. | 74 | .. | 285 | 4 | 383 | 9 | 154 | 4 | 16 | .. | 925 | 17 |
| 58th „ .. .. .. .. | 26 | 2 | 291 | .. | 188 | 5 | 92 | 3 | 11 | 5 | 7 | .. | 615 | 15 |
| 2nd Battalion, 60th Foot .. .. | 86 | .. | 380 | 1 | 147 | .. | 96 | 2 | 41 | 2 | 5 | 1 | 755 | 6 |
| 62nd Foot .. .. .. .. | 103 | 1 | 331 | 5 | 162 | 5 | 180 | 4 | 53 | 3 | 7 | 2 | 836 | 20 |
| 85th „ .. .. .. .. | 114 | .. | 375 | 6 | 146 | 10 | 136 | 5 | 41 | 4 | .. | .. | 812 | 25 |
| 92nd „ .. .. .. .. | 27 | .. | 347 | 3 | 217 | 5 | 114 | 4 | 48 | 2 | 5 | .. | 758 | 14 |
| 96th „ .. .. .. .. | 21 | .. | 264 | 6 | 274 | 7 | 236 | 5 | 70 | 2 | 9 | .. | 874 | 20 |
| 103rd „ .. .. .. .. | 35 | .. | 141 | 3 | 168 | 4 | 149 | 5 | 108 | .. | 25 | 2 | 626 | 14 |
| 104th „ .. .. .. .. | 16 | 1 | 77 | 5 | 154 | 4 | 195 | 6 | 96 | 2 | 12 | 1 | 550 | 19 |
| 105th „ .. .. .. .. | 15 | 2 | 181 | 4 | 288 | 3 | 126 | 5 | 53 | 3 | 5 | 1 | 668 | 18 |
| 106th „ .. .. .. .. | 18 | .. | 222 | 1 | 266 | 2 | 156 | 5 | 80 | 3 | 19 | 4 | 761 | 15 |
| 107th „ .. .. .. .. | 81 | 1 | 319 | 7 | 242 | 2 | 163 | 5 | 50 | 2 | 4 | 1 | 859 | 18 |
| 109th „ .. .. .. .. | 131 | .. | 318 | 4 | 219 | 2 | 93 | 2 | 28 | 8 | 16 | 8 | 805 | 24 |
| | 1,948 | 15 | 8,775 | 157 | 9,407 | 185 | 6,750 | 214 | 2,486 | 109 | 370 | 32 | 29,736 | 711 |

Abstract No. 22—*continued.*

ABSTRACT showing the Ages of the Troops serving in the Madras Command, and the Deaths at each Age, during the Year 1870.

| | Under 20 Years. | | 20 and under 25. | | 25 and under 30. | | 30 and under 35. | | 35 and under 40. | | 40 and upwards. | | Total. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. |
| 16th Lancers .. .. .. | 8 | .. | 84 | .. | 147 | 2 | 162 | 4 | 37 | 3 | 4 | .. | 442 | 9 |
| 18th Hussars .. .. .. | 16 | .. | 58 | .. | 136 | 4 | 139 | 11 | 30 | 1 | 4 | .. | 383 | 16 |
| D Brigade Royal Horse Artillery.. | 12 | .. | 130 | .. | 138 | 2 | 185 | 4 | 63 | 1 | 22 | 1 | 550 | 8 |
| 5th „ Royal Artillery .. | 4 | .. | 146 | 3 | 109 | 4 | 102 | 4 | 54 | 3 | 14 | .. | 429 | 14 |
| 9th „ „ .. .. | 27 | 1 | 134 | 5 | 122 | 5 | 124 | 6 | 30 | 3 | 1 | 1 | 438 | 21 |
| 20th „ „ .. .. | 20 | .. | 139 | 1 | 286 | 6 | 189 | 7 | 54 | 5 | 33 | .. | 721 | 19 |
| 23rd „ „ .. .. | 9 | .. | 136 | 1 | 196 | 3 | 255 | 4 | 52 | 5 | 17 | .. | 665 | 13 |
| 2nd Battalion 10th Foot .. .. | 35 | 1 | 115 | 2 | 346 | 5 | 195 | 5 | 38 | 5 | 4 | .. | 733 | 18 |
| 2nd „ 21st „ .. .. | 25 | .. | 141 | 1 | 387 | 3 | 175 | 3 | 65 | 2 | 4 | .. | 797 | 9 |
| 2nd „ 24th „ .. .. | 51 | .. | 254 | 7 | 216 | 2 | 99 | 5 | 32 | .. | 2 | .. | 654 | 14 |
| 45th Foot .. .. .. .. | 233 | .. | 228 | 1 | 240 | 11 | 97 | 7 | 17 | 4 | .. | .. | 815 | 23 |
| 3rd Battalion 60th Foot .. .. | 32 | 1 | 195 | 1 | 132 | 2 | 337 | 2 | 120 | .. | 8 | .. | 824 | 6 |
| 76th Foot .. .. .. .. | 84 | 3 | 147 | 10 | 223 | 16 | 205 | 10 | 83 | 3 | 12 | .. | 754 | 42 |
| 79th „ .. .. .. .. | 1 | .. | 238 | 1 | 220 | .. | 183 | 5 | 35 | 3 | 3 | 1 | 680 | 10 |
| Total .. | 557 | 6 | 2,145 | 33 | 2,898 | 65 | 2,447 | 77 | 710 | 38 | 128 | 3 | 8,885 | 222 |

## Abstract No. 22—*continued.*

ABSTRACT showing the Ages of the Troops serving in the Bombay Command, and the Deaths at each Age, during the Year 1870.

| | Under 20 Years. | | 20 and under 25. | | 25 and under 30. | | 30 and under 35. | | 35 and under 40. | | 40 and upwards. | | Total. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. |
| 3rd Hussars.. .. .. .. | 30 | 1 | 162 | 1 | 109 | 1 | 74 | 3 | 37 | 1 | 7 | .. | 419 | 7 |
| 15th „ .. .. .. .. | 102 | .. | 110 | 4 | 130 | .. | 103 | 1 | 12 | .. | 2 | 1 | 459 | 6 |
| E Brigade Royal Horse Artillery. | 13 | .. | 84 | .. | 175 | 1 | 173 | 1 | 88 | 3 | 15 | .. | 548 | 5 |
| 6th „ Royal Artillery .. | 11 | .. | 192 | 3 | 105 | 1 | 81 | 2 | 82 | 2 | 9 | .. | 480 | 8 |
| 9th „ „ .. .. | 28 | 1 | 188 | 9 | 164 | 1 | 147 | 3 | 46 | 5 | 7 | 2 | 580 | 21 |
| 18th „ „ .. .. | 6 | .. | 164 | 4 | 307 | 5 | 217 | 3 | 108 | 3 | 40 | .. | 842 | 15 |
| 1st Battalion 2nd Foot.. .. | 15 | 2 | 366 | 3 | 206 | 6 | 122 | 2 | 79 | 1 | 7 | 1 | 795 | 15 |
| 1st „ 8th „ .. .. | 123 | .. | 305 | 9 | 235 | 7 | 85 | 5 | 50 | 4 | 2 | .. | 800 | 25 |
| 49th Foot .. .. .. .. | 120 | .. | 252 | 8 | 207 | 3 | 114 | 5 | 64 | 1 | 1 | 2 | 758 | 19 |
| 59th „ .. .. .. .. | 89 | 1 | 395 | 1 | 161 | 4 | 126 | 2 | 70 | 1 | 18 | 1 | 859 | 10 |
| 108th „ .. .. .. .. | 173 | .. | 329 | 2 | 176 | .. | 122 | 4 | 37 | 5 | 3 | .. | 840 | 11 |
| Total .. .. | 710 | 5 | 2,547 | 44 | 1,975 | 29 | 1,364 | 31 | 673 | 26 | 111 | 7 | 7,380 | 142 |

APPENDIX No. XXI—*continued.*

ABSTRACT No. 23, showing the Cases of Sickness and Deaths among Troops on board Ship, proceeding on and returning from Foreign Service.

| | Passage Out. | | | | Passage Home. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | To Mediterranean, America Cape, and Ceylon. | | To India viâ Egypt. | | From Mediterranean, West Indies, and British America. | | From Cape of Good Hope and Australia. | | From India viâ Egypt. | |
| Embarked .. .. | 2,347 | | 10,770 | | 4 432 | | 2,458 | | 6,186 | |
| Average Annual Strength . | 170 | | 1,046 | | 237 | | 455 | | 627 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| I. *General Diseases.* | | | | | | | | | | |
| 1. Febrile: | | | | | | | | | | |
| Small Pox .. .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Measles .. .. | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Scarlet Fever . | 1 | .. | 2 | 1 | .. | .. | .. | .. | .. | .. |
| Enteric Fever .. | .. | .. | 5 | 1 | .. | .. | 1 | 1 | .. | .. |
| Simple Cont. Fever | 4 | .. | 13 | 1 | 3 | .. | 10 | 2 | 3 | .. |
| Febricula .. .. | .. | .. | 5 | .. | 1 | .. | 3 | .. | 1 | .. |
| Yellow Fever .. | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. |
| Ague .. .. | 1 | .. | 14 | .. | .. | .. | .. | .. | 54 | .. |
| Remittent Fever .. | .. | .. | 1 | .. | .. | .. | .. | .. | 10 | 2 |
| Simple Cholera .. | .. | .. | 6 | .. | .. | .. | .. | .. | .. | .. |
| Influenza .. .. | 4 | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Erysipelas .. .. | 1 | .. | 2 | .. | .. | .. | .. | .. | .. | .. |
| Mumps .. .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| 2. Constitutional: | | | | | | | | | | |
| Acute Rheumatism | 3 | .. | 23 | .. | 4 | .. | 2 | .. | 2 | .. |
| Chronic „ | 1 | .. | 3 | .. | 2 | .. | .. | .. | 3 | .. |
| Primary Syphilis.. | 7 | .. | 132 | .. | 6 | .. | 19 | .. | 23 | .. |
| Secondary „ | 5 | .. | 13 | .. | 1 | .. | 6 | .. | 6 | .. |
| Scrofula .. .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| Phthisis Pulmonalis | .. | .. | 1 | 1 | 1 | .. | 5 | .. | 6 | 1 |
| Scurvy .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. |
| Anæmia .. .. | 1 | .. | .. | .. | .. | .. | .. | .. | 2 | .. |
| General Dropsy .. | .. | .. | 1 | .. | .. | .. | .. | 1 | 2 | .. |
| Fibro-Cellular Tumr. | 1 | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| II. *Local Diseases.* | | | | | | | | | | |
| 1. Diseases of the Nervous System: | | | | | | | | | | |
| Paralysis .. .. | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. |
| Epilepsy .. .. | .. | .. | 1 | .. | 1 | .. | .. | .. | .. | .. |
| Neuralgia .. .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. |
| Dementia .. .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |

Abstract No. 23—*continued.*

| | Passage Out. | | | | Passage Home. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | To Mediterranean, America, Cape, and Ceylon. | | To India viâ Egypt. | | From Mediterranean, West Indies, and British America. | | From Cape of Good Hope and Australia. | | From India viâ Egypt. | |
| Embarked .. .. | 2,347 | | 10,770 | | 4,432 | | 2,458 | | 6,186 | |
| Average Annual Strength .. | 170 | | 1,046 | | 237 | | 455 | | 627 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| 2. Diseases of the Eye: | | | | | | | | | | |
| Conjunctivitis .. | 2 | .. | 7 | .. | 2 | .. | 14 | .. | 9 | .. |
| Tarsal Ophthalmia.. | 2 | .. | 2 | .. | 3 | .. | 1 | .. | .. | .. |
| Inflam: of Cornea | .. | .. | 2 | .. | .. | .. | .. | .. | 1 | .. |
| Iritis .. .. | .. | .. | 1 | .. | .. | .. | 2 | .. | .. | .. |
| 3. Diseases of the Ear: | | | | | | | | | | |
| Inflam: Ext: Meatus | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| 5. Circulatory Syst.: | | | | | | | | | | |
| Valve Dis: of Heart | .. | .. | .. | .. | .. | .. | .. | .. | 2 | 1 |
| Palpitation „ | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Aneurism of Aorta | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. |
| Aneurism .. .. | .. | .. | .. | .. | .. | .. | 1 | .. | 2 | .. |
| Varicose Veins .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| Syncope .. .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| 6. Absorbent System: | | | | | | | | | | |
| Inflam: of Glands .. | .. | .. | 3 | .. | 5 | .. | .. | .. | 12 | .. |
| Suppuration „ | 1 | .. | 3 | .. | 1 | .. | .. | .. | 1 | .. |
| 7. Diseases of Ductless Glands: | | | | | | | | | | |
| Enlargement of Glds | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| 8. Respiratory Syst.: | | | | | | | | | | |
| Bronchitis .. .. | 2 | .. | 25 | .. | 9 | .. | 14 | .. | 16 | 1 |
| Pneumonia.. .. | 1 | .. | 12 | .. | 2 | 1 | 1 | .. | 4 | 1 |
| Pleurisy .. .. | .. | .. | 2 | 1 | .. | .. | .. | .. | 5 | 1 |
| 9. Digestive System: | | | | | | | | | | |
| Gum Boil .. .. | 2 | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| Tonsillitis .. .. | 4 | .. | 23 | .. | 2 | .. | .. | .. | .. | .. |
| Hæmatemesis .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Dyspepsia .. .. | 3 | .. | 7 | .. | 1 | .. | 2 | .. | .. | .. |
| Enteritis .. .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Dysentery .. .. | .. | .. | .. | .. | 2 | .. | 1 | .. | 18 | 5 |
| Diarrhœa .. .. | 3 | .. | 6 | .. | .. | .. | 3 | .. | 10 | 2 |
| Colic .. .. | .. | .. | .. | .. | 2 | .. | 1 | .. | .. | .. |
| Ascaris Lumbricoides | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |

Abstract No. 23—*continued.*

| | Passage Out. | | | | Passage Home. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | To Mediterranean, America, Cape, and Ceylon. | | To India viâ Egypt. | | From Mediterranean. West Indies and British America. | | From Cape of Good Hope and Australia. | | From India viâ Egypt. | |
| Embarked .. .. | 2,347 | | 10,770 | | 4,432 | | 2,458 | | 6,186 | |
| Average Annual Strength .. | 170 | | 1,046 | | 237 | | 455 | | 627 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| Ulceration of Anus.. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Hæmorrhoids .. | .. | .. | 2 | .. | 2 | .. | .. | .. | 1 | .. |
| Hepatitis .. .. | .. | .. | .. | .. | .. | .. | 3 | .. | 5 | 2 |
| Jaundice .. .. | .. | .. | 5 | .. | .. | .. | 1 | .. | 1 | .. |
| Splenitis .. .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| 10. Urinary System: | | | | | | | | | | |
| Bright's Disease .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| Gonorrhœa .. .. | 20 | .. | 59 | .. | 18 | .. | 31 | .. | 5 | .. |
| Phimosis, &c. .. | 1 | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Epididymitis .. | .. | .. | 1 | .. | .. | .. | .. | .. | 1 | .. |
| Bubo .. .. | .. | .. | 14 | .. | .. | .. | 7 | .. | 1 | .. |
| Stricture of Urethra | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| Rupture „ | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. |
| Urinary Fistulá .. | .. | .. | 1 | .. | .. | .. | .. | .. | 1 | .. |
| Retention of Urine | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| 11. Generative Syst.: | | | | | | | | | | |
| Orchitis .. .. | 3 | .. | 12 | .. | 3 | .. | 4 | .. | 3 | .. |
| 12. Organs of Locomotion: | | | | | | | | | | |
| Ostitis .. .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Caries .. .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Acute Synovitis .. | .. | .. | .. | .. | 1 | .. | .. | .. | 2 | .. |
| Dropsy of Joint .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| 13. Diseases of Cellular Tissue. | | | | | | | | | | |
| Inflam: of Cell: Tis: | 2 | .. | 6 | .. | 1 | .. | .. | .. | .. | .. |
| Abscess „ „ | 1 | .. | 18 | .. | 2 | .. | 7 | .. | .. | .. |
| 14. Cutaneous Syst.: | | | | | | | | | | |
| Herpes .. .. | .. | .. | 2 | .. | .. | .. | 1 | .. | .. | .. |
| Erythema .. .. | .. | .. | 2 | .. | .. | .. | .. | .. | .. | .. |
| Eczema .. .. | 1 | .. | 4 | .. | .. | .. | 6 | .. | .. | .. |
| Ulcer .. .. | 9 | .. | 21 | .. | 6 | .. | 31 | .. | 5 | .. |
| Boil .. .. | 3 | .. | 8 | .. | 1 | .. | 4 | .. | .. | .. |
| Carbuncle .. .. | 1 | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Whitlow .. .. | 2 | .. | 1 | .. | 1 | .. | 1 | .. | .. | .. |
| Itch .. .. .. | .. | .. | 25 | .. | .. | .. | 3 | .. | .. | .. |
| Warts .. .. | .. | .. | 3 | .. | .. | .. | 1 | .. | .. | .. |

Abstract No. 23—*continued.*

| | Passage Out. | | | | Passage Home. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | To Mediterranean, America, Cape, and Ceylon. | | To India viâ Egypt. | | From Mediterranean, West Indies, and British America. | | From Cape of Good Hope and Australia. | | From India viâ Egypt. | |
| Embarked .. .. | 2,347 | | 10,770 | | 4,432 | | 2,458 | | 6,186 | |
| Average Annual Strength .. | 170 | | 1,046 | | 237 | | 455 | | 627 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| III. *Conditions, &c.* | | | | | | | | | | |
| General Debility .. | 2 | .. | 6 | .. | .. | .. | .. | .. | 1 | .. |
| IV. *Poisons.* | | | | | | | | | | |
| Delirium Tremens.. | .. | .. | .. | .. | 6 | 1 | 2 | 1 | 1 | .. |
| V. *Injuries.* | | | | | | | | | | |
| 2. Accidental: | | | | | | | | | | |
| Burns and Scalds .. | .. | .. | 5 | .. | 2 | .. | 2 | .. | .. | .. |
| Multiple Injury .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. |
| Contusion .. .. | .. | .. | 17 | .. | 9 | .. | 9 | .. | 5 | .. |
| Concussion of Brain | 5 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Fracture .. .. | .. | .. | 2 | .. | 1 | .. | 7 | .. | 2 | .. |
| Wounds .. .. | 3 | .. | 9 | .. | 3 | .. | 6 | .. | 1 | .. |
| „ from Gunshot | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Sprain .. .. | 4 | .. | 12 | .. | 1 | .. | 1 | .. | 2 | .. |
| Dislocation .. .. | .. | .. | 2 | .. | 1 | .. | 1 | .. | .. | .. |
| Blisters of the Feet | 1 | .. | 3 | .. | 2 | .. | .. | .. | .. | .. |
| 5. Judicial .. .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| No appreciable Dis. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Total .. .. | 113 | .. | 573 | 5 | 112 | 4 | 221 | 6 | 235 | 16 |

APPENDIX No. XXI—*continued.*

ABSTRACT No. 24, showing the Cases of Sickness and Deaths among Troops on board Ship proceeding from one Colony or Station to another.

| | Intercolonial. | | | |
|---|---|---|---|---|
| | White Troops. | | Black Troops. | |
| Number of Men Embarked .. .. .. | 4,923 | | 1,037 | |
| Average Annual Strength .. .. .. | 214 | | 96 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. |
| I. *General Diseases.* | | | | |
| 1. Febrile: | | | | |
| Simple Continued Fever .. .. .. | 6 | 1 | .. | .. |
| Ague .. .. .. .. .. .. | 5 | .. | 8 | .. |
| Remittent Fever .. .. .. .. | 5 | .. | .. | .. |
| 2. Constitutional: | | | | |
| Acute Rheumatism .. .. .. .. | 2 | .. | 1 | .. |
| Chronic „ .. .. .. .. | 3 | .. | 1 | .. |
| Primary Syphilis .. .. .. .. | 17 | .. | 6 | .. |
| Scrofula .. .. .. .. .. .. | .. | .. | 1 | .. |
| Phthisis Pulmonalis .. .. .. .. | .. | .. | 1 | .. |
| Hæmoptysis .. .. .. .. .. | 2 | .. | .. | .. |
| II. *Local Diseases.* | | | | |
| 1. Diseases of the Nervous System: | | | | |
| Epilepsy .. .. .. .. .. | 2 | 1 | .. | .. |
| 2. Diseases of the Eye: | | | | |
| Conjunctivitis .. .. .. .. .. | 2 | .. | 1 | .. |
| Iritis .. .. .. .. .. | .. | .. | 1 | .. |
| 6. Absorbent System: | | | | |
| Inflammation of Glands .. .. .. | 1 | .. | .. | .. |
| Suppuration „ .. .. .. | 2 | .. | .. | .. |
| 8. Respiratory System: | | | | |
| Bronchitis .. .. .. .. .. | 5 | .. | 3 | .. |
| Pneumonia .. .. .. .. .. | .. | .. | 1 | .. |
| 9. Digestive System: | | | | |
| Inflammation of Salivary Glands .. .. | 1 | .. | .. | .. |
| Tonsillitis .. .. .. .. .. | .. | .. | 1 | .. |
| Dyspepsia .. .. .. .. .. | 1 | .. | .. | .. |
| Dysentery .. .. .. .. .. | 2 | .. | 2 | 1 |
| Diarrhœa .. .. .. .. .. | 4 | .. | 2 | .. |
| Colic .. .. .. .. .. .. | 1 | .. | .. | .. |
| Constipation .. .. .. .. .. | 1 | .. | .. | .. |
| Fistula in Ano .. .. .. .. .. | 1 | .. | .. | .. |
| Hepatitis .. .. .. .. .. | 1 | .. | 1 | .. |
| Splenitis .. .. .. .. .. | 1 | .. | .. | .. |

Abstract No. 24—*continued.*

| | Intercolonial. | | | |
|---|---|---|---|---|
| | White Troops. | | Black Troops | |
| Number of Men Embarked .. .. .. | 4,923 | | 1,037 | |
| Average Annual Strength .. .. .. | 214 | | 96 | |
| Diseases. | Admitted. | Died. | Admitted. | Died. |
| 10. Urinary System: | | | | |
| Nephritis .. .. .. .. .. | 1 | .. | .. | .. |
| Gonorrhœa .. .. .. .. .. | 8 | .. | .. | .. |
| Phimosis, &c. .. .. .. .. .. | 1 | .. | 1 | .. |
| Bubo .. .. .. .. .. .. | 1 | .. | .. | .. |
| Hæmaturia .. .. .. .. .. | 1 | .. | .. | .. |
| Incontinence of Urine .. .. .. .. | 1 | .. | .. | .. |
| 12. Organs of Locomotion: | | | | |
| Acute Synovitis .. .. .. .. | 1 | .. | .. | .. |
| 13. Diseases of Cellular Tissue: | | | | |
| Inflammation of Cellular Tissue .. .. | .. | .. | 1 | .. |
| 14. Cutaneous System: | | | | |
| Ulcer .. .. .. .. .. .. | 5 | .. | 5 | .. |
| IV. *Poisons.* | | | | |
| Delirium Tremens .. .. .. .. | 3 | 1 | 1 | .. |
| Alcohol .. .. .. .. .. .. | 1 | .. | .. | .. |
| V. *Injuries.* | | | | |
| 2. Accidental: | | | | |
| Contusion .. .. .. .. .. | 4 | .. | 3 | .. |
| Wounds .. .. .. .. .. .. | 1 | .. | 1 | .. |
| Sprain .. .. .. .. .. .. | 1 | .. | 1 | .. |
| Total .. .. .. .. | 94 | 3 | 43 | 1 |

## APPENDIX No. XXII.

ABSTRACT of Results of Meteorological Observations taken at Stations in England and Scotland in the Year 1870.

APPENDIX

ABSTRACT of Results of Meteorological Observations taken

ALDERSHOT CAMP. Lat. 51° 15′ N.

| Month. | Readings of the Barometer. | | | Temperature of the Air. | | | | | | | Mean Daily Readings of | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Mean | | | | | | Hygrometer. | |
| | Mean reduced and corrected to 32°. | Highest reduced and corrected to 32°. | Lowest reduced and corrected to 32°. | Highest during Month. | Lowest during Month. | Range during Month. | Of all the highest. | Of all the lowest. | Daily Range. | Approximate Temperature. | Maximum in Sun's rays. | Minimum on Grass. | Dry Bulb. | Wet Bulb. |
| January ... ... | 29·248 | 30·224 | 28·834 | 50·0 | 20·6 | 29·4 | 43·4 | 33·5 | 9·9 | 38·4 | 59·9 | 30·6 | 38·9 | 37·5 |
| February ... ... | 29·519 | 29·982 | 29·092 | 52·4 | 18·6 | 33·8 | 41·5 | 31·5 | 10·0 | 36·5 | 60·0 | 28·5 | 36·8 | 35·6 |
| March ... ... | 29·684 | 30·099 | 29·192 | 60·4 | 22·4 | 38·0 | 47·7 | 33·3 | 14·4 | 40·5 | 80·0 | 29·4 | 41·6 | 38·6 |
| April ... ... | 29·806 | 30·131 | 29·168 | 78·6 | 25·0 | 53·0 | 62·0 | 36·6 | 25·4 | 49·3 | 109·8 | 31·3 | 55·7 | 47·3 |
| May ... ... | 29·718 | 30·055 | 29·177 | 82·4 | 28·4 | 54·0 | 66·1 | 41·4 | 24·7 | 53·7 | 119·6 | 38·7 | 58·9 | 53·0 |
| June ... ... | 29·720 | 30·156 | 29·410 | 94·0 | 43·0 | 51·0 | 75·8 | 50·3 | 25·5 | 63·0 | 124·2 | 46·9 | 67·7 | 60·7 |
| July ... ... | 29·654 | 29·946 | 29·362 | 90·6 | 44·0 | 46·6 | 80·1 | 55·1 | 25·0 | 67·6 | 125·4 | 51·8 | 70·8 | 62·0 |
| August ... ... | 29·634 | 29·879 | 29·175 | 82·6 | 39·8 | 42·8 | 74·6 | 50·8 | 23·8 | 62·7 | 118·3 | 48·2 | 65·8 | 58·3 |
| September ... ... | 29·726 | 30·144 | 29·055 | 72·0 | 37·0 | 35·0 | 67·7 | 47·3 | 20·4 | 57·5 | 105·1 | 44·6 | 60·5 | 54·9 |
| October... ... ... | 29·380 | 30·172 | 28·586 | 69·0 | 32·0 | 37·0 | 58·7 | 42·8 | 15·9 | 50·7 | 86·4 | 40·0 | 52·4 | 49·0 |
| November ... ... | 29·440 | 30·143 | 28·798 | 55·0 | 27·0 | 28·0 | 48·7 | 35·2 | 13·5 | 41·9 | 69·8 | 31·9 | 42·6 | 40·5 |
| December ... ... | 29·540 | 30·225 | 28·766 | 56·2 | 11·0 | 45·2 | 37·6 | 27·4 | 10·2 | 32·5 | 49·8 | 24·4 | 33·3 | 32·2 |
| Yearly Sums, Means, and Totals ... | 29·622 | 30·114 | 29·051 | 70·2 | 29·1 | 41·1 | 58·6 | 40·4 | 18·2 | 49·5 | 92·3 | 37·2 | 52·1 | 47·5 |

CANTERBURY. Lat. 51° 17′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | ... | ... | ... | 52·0 | 13·5 | 38·5 | 45·0 | 31·3 | 13·7 | 38·1 | ... | ... | 40·9 | 40·0 |
| February ... ... | ... | ... | ... | 59·0 | 19·0 | 40·0 | 42·4 | 29·3 | 13·1 | 35·8 | ... | ... | 38·2 | 37·4 |
| March ... ... | ... | ... | ... | 65·0 | 24·0 | 41·0 | 47·5 | 32·7 | 14·8 | 40·1 | ... | ... | 42·0 | 40·4 |
| April ... ... | ... | ... | ... | 77·5 | 24·0 | 53·5 | 63·5 | 33·1 | 30·4 | 48·3 | ... | ... | 56·3 | 53·4 |
| May ... ... | ... | ... | ... | 84·0 | 31·0 | 53·0 | 66·5 | 38·6 | 27·9 | 52·5 | ... | ... | 59·8 | 56·7 |
| June ... ... | ... | ... | ... | 87·5 | 39·5 | 48·0 | 73·1 | 46·3 | 26·8 | 59·7 | ... | ... | 66·1 | 63·0 |
| July ... ... | ... | ... | ... | 90·8 | 41·0 | 49·8 | 78·2 | 52·2 | 26·0 | 65·2 | ... | ... | 71·2 | 67·8 |
| August ... ... | ... | ... | ... | 81·5 | 36·0 | 45·5 | 72·6 | 48·8 | 23·8 | 60·7 | ... | ... | 66·4 | 63·5 |
| September ... ... | ... | ... | ... | 72·0 | 32·5 | 39·5 | 68·2 | 41·0 | 27·2 | 54·6 | ... | ... | 62·7 | 59·8 |
| October ... ... | ... | ... | ... | 70·0 | 30·0 | 40·0 | 60·2 | 39·6 | 20·6 | 49·9 | ... | ... | 53·8 | 52·2 |
| November ... ... | ... | ... | ... | 59·0 | 5·0 | 54·0 | 50·2 | 31·1 | 19·1 | 40·6 | ... | ... | 43·3 | 42·6 |
| December ... ... | ... | ... | ... | 53·5 | 7·5 | 46·0 | 40·1 | 20·5 | 19·6 | 30·3 | ... | ... | 34·8 | 33·8 |
| Yearly Sums, Means, and Totals ... | ... | ... | ... | 70·9 | 25·2 | 45·7 | 58·9 | 37·0 | 21·9 | 48·0 | ... | ... | 53·9 | 50·9 |

CHATHAM. Lat. 51° 23′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | 29·838 | 30·485 | 28·965 | 50·4 | 18·3 | 32·1 | 42·8 | 31·7 | 11·1 | 37·2 | 58·5 | 27·1 | 39·6 | 38·2 |
| February ... ... | 29·710 | 30·184 | 29·246 | 56·2 | 18·0 | 38·2 | 40·0 | 29·0 | 11·0 | 34·5 | 60·3 | 26·4 | 37·0 | 35·8 |
| March ... ... | 29·868 | 30·330 | 29·401 | 60·4 | 23·0 | 37·4 | 45·5 | 32·0 | 13·3 | 38·8 | 69·5 | 30·0 | 41·2 | 39·2 |
| April ... ... | 30·013 | 30·368 | 29·378 | 77·6 | 23·6 | 54·0 | 60·1 | 36·2 | 23·9 | 48·1 | 98·1 | 28·0 | 54·2 | 49·1 |
| May ... ... | 29·918 | 30·264 | 29·343 | 83·0 | 30·0 | 53·0 | 65·0 | 39·7 | 25·3 | 52·3 | 106·1 | 36·4 | 59·4 | 54·4 |
| June ... ... | 29·948 | 30·386 | 29·588 | 89·0 | 39·5 | 49·5 | 72·9 | 48·9 | 24·0 | 60·9 | 113·7 | 47·1 | 66·8 | 59·5 |
| July ... ... | 29·814 | 30·128 | 29·512 | 90·0 | 42·6 | 47·4 | 77·4 | 53·0 | 24·4 | 65·2 | 112·0 | Useless | 69·5 | 64·0 |
| August ... ... | 29·797 | 30·115 | 29·260 | 82·0 | 37·9 | 44·1 | 72·7 | 50·1 | 22·6 | 61·4 | 108·2 | ... | 64·3 | 61·3 |
| September ... ... | 29·911 | 30·359 | 29·171 | 71·0 | 36·2 | 34·8 | 66·6 | 44·9 | 21·7 | 55·7 | 98·5 | 41·8 | 60·2 | 58·5 |
| October... ... | 29·576 | 30·401 | 28·731 | 66·9 | 30·0 | 36·9 | 60·2 | 40·7 | 19·5 | 50·4 | 85·2 | 36·8 | 53·1 | 52·2 |
| November ... ... | 29·650 | 30·360 | 29·008 | 58·2 | 22·1 | 36·1 | 50·3 | 33·6 | 16·7 | 41·9 | 72·0 | 30·8 | 44·0 | 43·4 |
| December ... ... | 29·721 | 30·455 | 29·013 | 58·7 | 6·8 | 51·9 | 39·7 | 26·0 | 13·7 | 32·8 | 60·2 | 24·1 | 34·7 | 34·0 |
| Yearly Sums, Means, and Totals ... | 29·814 | 30·319 | 29·219 | 70·3 | 27·3 | 43·0 | 57·8 | 38·9 | 18·9 | 48·3 | 86·9 | Useless | 52·0 | 49·1 |

No. XXII.

at Stations in England and Scotland in the Year 1870.

Long. 0° 45′ W. Height above Sea 325 feet.

| Hygrometrical Results from Glaisher's Tables (3rd edition). | | | | | | Atmospherical Conditions. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | In a Cubic Foot of Air. | | | | Number of Days for mean Direction of Wind. | | | | | Calculated from Robinson's Anemometer. | | | | | Amount of Rain fall. | |
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean Degree of Humidity. | Mean Weight of Cubic Foot of Air. | North. | East. | South. | West. | Number of calm, or nearly calm, Days. | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of Days on which Rain fell. | On the Ground. | Feet above the Ground. |
| | | | | | | | | | | | lbs. per sq. foot | Miles | | | | Inches. | Inches |
| 35·6 | ·210 | 2·5 | 0·3 | 89·2 | 548·2 | 5·00 | 6·00 | 9·50 | 10·50 | 0·00 | ... | 264·3 | 7·8 | 2·8 | 16 | 1·95 | 1·18 |
| 33·9 | ·196 | 2·3 | 0·3 | 90·0 | 548·1 | 6·50 | 7·50 | 8·50 | 5·50 | 0·00 | ... | 304·7 | 8·3 | 3·0 | 18 | 2·73 | 1·99 |
| 34·9 | ·204 | 2·4 | 0·7 | 78·2 | 546·1 | 11·50 | 6·50 | 5·00 | 8·00 | 0·00 | ... | 280·4 | 5·0 | 3·0 | 13 | 2·93 | 1·87 |
| 39·3 | ·242 | 2·7 | 2·3 | 54·4 | 533·1 | 7·50 | 7·00 | 4·00 | 11·50 | 0·00 | ... | 209·5 | 5·9 | 2·2 | 3 | 0·37 | 0·27 |
| 47·8 | ·331 | 3·7 | 1·9 | 66·5 | 527·7 | 7·00 | 5·00 | 9·00 | 10·00 | 0·00 | ... | 227·2 | 6·6 | 2·4 | 6 | 1·31 | 0·92 |
| 55·2 | ·437 | 4·8 | 2·7 | 64·0 | 519·2 | 9·00 | 2·50 | 3·00 | 15·50 | 0·00 | ... | 229·5 | 6·4 | 2·7 | 4 | 0·37 | 0·32 |
| 55·2 | ·437 | 4·8 | 3·4 | 57·8 | 514·1 | 7·50 | 7·00 | 5·50 | 11·00 | 0·00 | ... | 192·3 | 7·3 | 2·7 | 7 | 0·55 | 0·43 |
| 52·2 | ·391 | 4·3 | 2·6 | 61·3 | 518·9 | 13·00 | 6·50 | 2·50 | 9·00 | 0·00 | ... | 206·8 | 6·8 | 2·8 | 9 | 1·67 | 1·30 |
| 50·0 | ·361 | 4·0 | 1·9 | 68·5 | 525·9 | 4·50 | 7·50 | 8·00 | 10·00 | 0·00 | ... | 206·0 | 6·7 | 3·0 | 14 | 2·22 | 1·72 |
| 45·5 | ·306 | 3·5 | 1·0 | 78·0 | 531·2 | 5·50 | 4·50 | 8·50 | 12·50 | 0·00 | ... | 285·6 | 7·2 | 3·1 | 19 | 3·99 | 2·78 |
| 38·0 | ·229 | 2·6 | 0·5 | 84·3 | 542·8 | 6·50 | 5·00 | 9·50 | 9·00 | 0·00 | ... | 173·4 | 7·6 | 2·6 | 15 | 1·96 | 1·41 |
| 30·1 | ·169 | 2·0 | 0·3 | 88·3 | 555·6 | 10·00 | 8·00 | 4·00 | 9·00 | 0·00 | ... | 187·8 | 8·3 | 2·9 | 16 | 3·38 | 2·35 |
| 43·1 | ·396 | 3·3 | 1·5 | 73·4 | 534·2 | 93·50 | 73·00 | 77·00 | 121·50 | 0·00 | ... | 230·6 | 7·2 | 2·9 | 140 | 23·43 | 16·54 |

Long. 1° 5′ E. Height above Sea 80 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 38·9 | ·236 | 2·8 | 2·0 | 92·8 | ... | 1·00 | 9·00 | 11·00 | 10·00 | 0·00 | ... | ... | 2·8 | 3·3 | 14 | 1·37 | ... |
| 36·3 | ·214 | 2·5 | 2·0 | 93·2 | ... | 2·50 | 12·50 | 8·50 | 4·50 | 0·00 | ... | ... | 3·1 | 3·7 | 5 | 0·29 | ... |
| 38·4 | ·233 | 2·7 | 0·4 | 87·8 | ... | 8·50 | 9·00 | 5·50 | 8·00 | 0·00 | ... | ... | 2·8 | 3·6 | 7 | 1·71 | ... |
| 50·7 | ·371 | 4·2 | 0·9 | 81·6 | ... | 7·00 | 4·50 | 8·50 | 9·00 | 1·00 | ... | ... | 1·5 | 2·9 | 2 | 0·25 | ... |
| 54·0 | ·418 | 4·7 | 1·1 | 82·2 | ... | 5·00 | 9·00 | 11·00 | 3·00 | 3·00 | ... | ... | 2·2 | 3·8 | 6 | 0·89 | ... |
| 60·[illegible] | ·527 | 5·8 | 1·2 | 82·5 | ... | 5·50 | 8·00 | 6·50 | 9·00 | 1·00 | ... | ... | 3·1 | 3·6 | 4 | 0·44 | ... |
| 65·2 | ·619 | 6·8 | 1·6 | 81·0 | ... | 4·50 | 9·50 | 7·50 | 9·50 | 0·00 | ... | ... | 2·6 | 3·9 | 9 | 0·99 | ... |
| 61·2 | ·540 | 5·9 | 1·2 | 83·0 | ... | 11·00 | 6·00 | 4·00 | 7·00 | 3·00 | ... | ... | 3·2 | 4·0 | 7 | 1·23 | ... |
| 57·4 | ·472 | 5·2 | 1·1 | 83·3 | ... | 2·50 | 7·50 | 10·50 | 8·50 | 1·00 | ... | ... | 2·6 | 3·4 | 7 | 1·99 | ... |
| 50·6 | ·369 | 4·2 | 0·5 | 88·8 | ... | 1·50 | 6·25 | 9·75 | 13·50 | 0·00 | ... | ... | 3·6 | 2·9 | 20 | 3·88 | ... |
| 41·8 | ·265 | 3·0 | 0·2 | 94·4 | ... | 8·75 | 2·75 | 7·25 | 11·25 | 0·00 | ... | ... | 2·6 | 1·4 | 16 | 1·59 | ... |
| 32·2 | ·182 | 2·1 | 0·2 | 90·0 | ... | 5·00 | 13·50 | 8·50 | 4·00 | 0·00 | ... | ... | 3·7 | 0·4 | 10 | 2·10 | ... |
| 48·9 | ·370 | 4·2 | 1·0 | 86·7 | ... | 62·75 | 97·50 | 98·50 | 97·25 | 9·00 | ... | ... | 2·8 | 3·1 | 107 | 16·64 | ... |

Long. 0° 32′ W. Height above Sea 160 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36·4 | ·215 | 2·5 | 0·4 | 88·8 | 553·6 | 4·50 | 7·00 | 12·00 | 6·00 | 1·50 | ... | 250·4 | 7·0 | 2·5 | 18 | 1·77 | 1·70 |
| 34·1 | ·196 | 2·3 | 0·3 | 89·4 | 554·3 | 3·50 | 9·00 | 9·75 | 5·75 | 0·00 | ... | 359·9 | 8·8 | 2·1 | 18 | 0·69 | 0·66 |
| 36·7 | ·217 | 2·5 | 0·5 | 84·4 | 552·3 | 11·25 | 7·00 | 4·75 | 8·00 | 0·00 | ... | 283·6 | 8·4 | 1·0 | 19 | 2·43 | 2·31 |
| 44·1 | ·289 | 3·3 | 1·4 | 68·5 | 540·6 | 4·25 | 7·00 | 4·00 | 13·25 | 1·50 | ... | 195·0 | 5·0 | 1·8 | 7 | 0·41 | 0·39 |
| 49·9 | ·360 | 4·0 | 1·6 | 71·0 | 532·9 | 5·75 | 6·50 | 9·50 | 7·75 | 1·50 | ... | 215·8 | 5·8 | 2·7 | 10 | 1·07 | 1·01 |
| 53·6 | ·412 | 4·6 | 2·7 | 62·8 | 525·8 | 5·50 | 4·00 | 4·75 | 14·25 | 1·50 | ... | 190·4 | 5·1 | 3·1 | 4 | 0·49 | 0·43 |
| 59·7 | ·541 | 5·6 | 2·3 | 71·0 | 520·1 | 7·50 | 8·50 | 5·25 | 9·75 | 0·00 | ... | 173·6 | 6·3 | 3·4 | 9 | 1·43 | 1·32 |
| 58·8 | ·498 | 5·5 | 1·2 | 82·3 | 524·0 | 13·25 | 4·50 | 5·50 | 7·75 | 0·00 | ... | 211·1 | 6·1 | 5·4 | 10 | 1·91 | 1·87 |
| 57·0 | ·466 | 5·2 | 0·6 | 89·8 | 531·4 | 3·25 | 9·25 | 9·00 | 7·00 | 1·50 | ... | 180·5 | 4·5 | 3·0 | 7 | 1·95 | 1·94 |
| 51·3 | ·378 | 4·2 | 0·3 | 93·7 | 533·4 | 3·75 | 8·25 | 10·00 | 8·00 | 1·00 | ... | 241·7 | 6·0 | 3·8 | 16 | 3·76 | 3·64 |
| 42·7 | ·274 | 3·1 | 0·2 | 95·2 | 545·9 | 5·50 | 4·50 | 12·00 | 6·50 | 1·50 | ... | 173·0 | 6·2 | 2·4 | 8 | 1·44 | 1·23 |
| 32·9 | ·188 | 2·2 | 0·2 | 93·0 | 557·2 | 7·50 | 5·25 | 6·75 | 9·00 | 2·50 | ... | 229·7 | 7·6 | 2·7 | 10 | 2·08 | 1·59 |
| 46·4 | ·336 | 3·7 | 0·9 | 84·2 | 539·3 | 75·50 | 80·75 | 93·25 | 103·00 | 12·50 | ... | 224·6 | 6·4 | 2·8 | 136 | 19·43 | 18·09 |

Appendix

## COLCHESTER. Lat. 51° 53′ N.

| Month. | Readings of the Barometer. | | | Temperature of the Air. | | | | | | | Mean Daily Readings of | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean reduced and corrected to 32°. | Highest reduced and corrected to 32°. | Lowest reduced and corrected to 32°. | Highest during Month. | Lowest during Month. | Range during Month. | Mean | | | | Maximum in Sun's rays. | Minimum on Grass. | Hygrometer. | |
| | | | | | | | Of all the highest. | Of all the lowest. | Daily Range. | Approximate Temperature. | | | Dry Bulb. | Wet Bulb. |
| January ... ... | 29·857 | 30·477 | 28·988 | 50·9 | 20·3 | 30·6 | 46·1 | 29·6 | 16·5 | 37·8 | 55·2 | 25·3 | 39·5 | 37·8 |
| February ... ... | 29·747 | 30·262 | 29·206 | 59·3 | 17·4 | 41·9 | 46·6 | 27·5 | 19·1 | 37·0 | 60·8 | 23·1 | 37·2 | 35·8 |
| March ... ... ... | 29·892 | 30·321 | 29·433 | 64·3 | 22·4 | 41·9 | 48·2 | 31·3 | 16·9 | 39·7 | 76·3 | 26·7 | 42·2 | 39·9 |
| April ... ... ... | 30·030 | 30·411 | 29·406 | 75·6 | 25·3 | 50·3 | 61·2 | 34·9 | 26·3 | 48·0 | 101·1 | 29·0 | 54·6 | 49·0 |
| May ... ... ... | 29·928 | 30·254 | 29·358 | 83·2 | 29·7 | 53·5 | 65·7 | 38·9 | 26·8 | 52·3 | 108·0 | 32·9 | 59·3 | 53·0 |
| June ... ... ... | 29·968 | 30·392 | 29·578 | 87·2 | 39·6 | 47·6 | 73·5 | 47·2 | 26·3 | 60·3 | 116·3 | 41·1 | 66·6 | 58·3 |
| July ... ... ... | 29·858 | 30·167 | 29·566 | 86·9 | 42·4 | 44·5 | 77·5 | 53·0 | 24·5 | 65·2 | 119·5 | 47·6 | 70·8 | 62·7 |
| August ... ... ... | 29·821 | 30·141 | 29·269 | 82·9 | 39·1 | 42·9 | 72·9 | 49·4 | 23·5 | 61·1 | 113·6 | 44·3 | 65·5 | 58·7 |
| September ... ... | 29·940 | 30·412 | 29·188 | 73·7 | 35·6 | 38·1 | 68·2 | 44·7 | 23·5 | 56·4 | 104·4 | 38·4 | 62·5 | 56·1 |
| October... ... ... | 29·602 | 30·469 | 28·740 | 68·4 | 27·2 | 41·2 | 59·3 | 40·2 | 19·1 | 49·7 | 84·5 | 34·0 | 54·0 | 50·2 |
| November ... ... | 29·629 | 30·536 | 29·067 | 56·6 | 21·4 | 35·2 | 51·3 | 32·7 | 18·6 | 42·0 | 62·9 | 26·9 | 44·8 | 42·8 |
| December ... ... | 29·762 | 30·491 | 29·047 | 57·0 | 9·8 | 47·2 | 46·8 | 25·7 | 21·1 | 36·2 | 50·9 | 21·5 | 35·1 | 34·4 |
| Yearly Sums, Means, and Totals ... | 29·753 | 30·350 | 29·312 | 70·4 | 27·5 | 42·9 | 59·7 | 37·9 | 21·8 | 48·8 | 87·8 | 32·6 | 52·7 | 48·2 |

## DEVONPORT. Lat. 50° 17′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | 29·753 | 30·318 | 28·965 | 55·7 | 20·3 | 35·4 | 47·8 | 33·9 | 13·9 | 40·8 | 59·8 | 28·7 | 43·1 | 40·9 |
| February ... ... | 29·589 | 30·067 | 29·181 | 55·4 | 10·4 | 45·0 | 46·1 | 30·1 | 16·0 | 38·1 | 71·6 | 26·7 | 41·0 | 39·2 |
| March ... ... ... | 29·833 | 30·250 | 29·199 | 63·4 | 22·2 | 41·2 | 52·3 | 33·5 | 18·8 | 42·9 | 88·3 | 28·9 | 45·8 | 42·5 |
| April ... ... ... | 29·954 | 30·280 | 29·297 | 71·6 | 25·0 | 46·6 | 61·1 | 35·5 | 25·6 | 48·3 | 118·1 | 28·8 | 54·1 | 49·1 |
| May ... ... ... | 29·831 | 30·182 | 29·064 | 72·4 | 29·0 | 43·4 | 65·1 | 41·3 | 23·8 | 53·2 | 123·0 | 33·6 | 58·2 | 53·2 |
| June ... ... ... | 29·942 | 30·301 | 29·594 | 84·0 | 37·2 | 46·8 | 73·7 | 48·2 | 25·5 | 60·9 | 136·7 | 41·9 | 66·6 | 59·7 |
| July ... ... ... | 29·781 | 30·091 | 29·452 | 83·8 | 40·0 | 43·8 | 76·8 | 52·2 | 24·6 | 64·5 | 133·3 | 44·7 | 69·7 | 62·2 |
| August ... ... ... | 29·773 | 30·062 | 29·407 | 84·8 | 38·6 | 46·2 | 75·5 | 49·3 | 26·2 | 62·4 | 133·6 | 37·8 | 69·0 | 61·0 |
| September ... ... | 29·842 | 30·253 | 29·121 | 76·2 | 35·6 | 40·6 | 70·5 | 45·5 | 25·0 | 58·0 | 114·3 | 35·4 | 64·6 | 59·1 |
| October... ... ... | 29·556 | 30·245 | 28·821 | 71·4 | 28·2 | 43·2 | 62·6 | 42·2 | 20·4 | 52·4 | 95·6 | 31·3 | 56·9 | 53·4 |
| November ... ... | 29·554 | 30·284 | 28·916 | 58·2 | 24·0 | 34·9 | 55·3 | 33·9 | 19·4 | 43·6 | 76·3 | 23·9 | 46·9 | 44·6 |
| December ... ... | 29·667 | 30·338 | 28·837 | 56·0 | 9·8 | 46·2 | 43·8 | 26·9 | 16.9 | 35·3 | 60·4 | 17·3 | 37·9 | 35·8 |
| Yearly Sums, Means, and Totals ... | 29·756 | 30·222 | 29·154 | 69·4 | 26·7 | 42·7 | 60·7 | 39·4 | 21·3 | 50·0 | 100·9 | 31·6 | 54·5 | 50·2 |

## DOVER. Lat. 51° 8′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | ... | ... | ... | 50·0 | 23·0 | 27·0 | 42·2 | 30·6 | 11·6 | 36·4 | ... | ... | 39·3 | 36·8 |
| February ... ... | ... | ... | ... | 52·0 | 15·0 | 37·0 | 38·3 | 27·4 | 10·9 | 32·8 | ... | ... | 35·6 | 33·3 |
| March ... ... ... | ... | ... | ... | 56·0 | 22·0 | 34·0 | 44·5 | 30·7 | 13·8 | 37·6 | ... | ... | 40·7 | 37·7 |
| April ... ... ... | ... | ... | ... | 74·0 | 31·0 | 43·0 | 55·8 | 36·7 | 19·1 | 46·2 | ... | ... | 51·6 | 46·8 |
| May ... ... ... | ... | ... | ... | 76·0 | 32·0 | 44·0 | 59·1 | 39·9 | 19·2 | 49·5 | ... | ... | 55·0 | 50·2 |
| June ... ... ... | ... | ... | ... | 78·0 | 42·0 | 36·0 | 66·4 | 46·3 | 20·1 | 56·3 | ... | ... | 61·4 | 58·7 |
| July ... ... ... | ... | ... | ... | 82·0 | 42·0 | 40·0 | 71·6 | 52·4 | 19·2 | 62·0 | ... | ... | 66·0 | 62·0 |
| August ... ... ... | ... | ... | ... | 75·0 | 41·0 | 34·0 | 69·2 | 49·2 | 20·0 | 59·2 | ... | ... | 64·0 | 59·6 |
| September ... ... | ... | ... | ... | 69·0 | 42·0 | 27·0 | 64·3 | 46·4 | 17·9 | 55·4 | ... | ... | 60·4 | 56·7 |
| October... ... ... | ... | ... | ... | 67·0 | 32·0 | 35·0 | 57·8 | 40·4 | 17·4 | 49·1 | ... | ... | 54·0 | 51·4 |
| November ... ... | ... | ... | ... | 55·0 | 25·0 | 30·0 | 48·1 | 34·6 | 13·5 | 41·3 | ... | ... | 45·0 | 42·5 |
| December ... ... | ... | ... | ... | 53·0 | 6·0 | 47·0 | 38·4 | 24·4 | 14·0 | 31·4 | ... | ... | 35·7 | 33·6 |
| Yearly Sums, Means, and Totals ... | ... | ... | ... | 65·6 | 29·4 | 36·2 | 54·6 | 38·2 | 16·4 | 46·4 | ... | ... | 50·7 | 47·4 |

No. XXII—*continued.*

Long. 0° 54′ E. Height above Sea 109 feet.

| Hygrometrical Results from Glaisher's Tables (3rd edition). | | | | | | Atmospherical Conditions. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | In a Cubic Foot of Air. | | | | Number of Days for mean Direction of Wind. | | | | | Calculated from Robinson's Anemometer. | | | | | Amounts of Rain fall. | |
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean Degree of Humidity. | Mean Weight of Cubic Foot of Air. | North. | East. | South. | West. | Number of calm, or nearly calm, Days. | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of Days on which Rain fell. | On the Ground. | 0 Feet above the Ground. |
| | | | | | | | | | | | lbs. per sq. foot | Miles | | | | Inches | Inches |
| 35·6 | 209 | 2·4 | 0·4 | 94·4 | 554·2 | 7·75 | 6·50 | 7·50 | 9·25 | 0·00 | ... | 175·5 | 6·7 | 1·9 | 13 | 1·36 | 1·20 |
| 33·9 | ·195 | 2·1 | 6·0 | 80·2 | 550·5 | 6·00 | 8·50 | 9·00 | 4·50 | 0·00 | ... | 221·4 | 8·4 | 2·0 | 6 | 0·55 | 0·47 |
| 37·1 | ·221 | 2·6 | 6·0 | 82·9 | 551·8 | 12·00 | 7·50 | 3·25 | 8·25 | 0·00 | ... | 219·1 | 8·4 | 3·9 | 12 | 1·55 | 1·42 |
| 43·6 | ·283 | 3·2 | 1·6 | 66·0 | 540·5 | 6·75 | 7·25 | 6·75 | 9·25 | 0·00 | ... | 202·3 | 5·0 | 5·0 | 7 | 0·50 | 0·41 |
| 47·5 | ·327 | 3·7 | 2·0 | 64·8 | 538·5 | 4·50 | 6·50 | 10·25 | 9·75 | 0·00 | ... | 207·4 | 7·1 | 5·5 | 7 | 1·05 | 0·95 |
| 51·6 | ·382 | 4·2 | 2·9 | 59·4 | 526·6 | 9·25 | 5·00 | 6·25 | 9·50 | 0·00 | ... | 165·0 | 7·1 | 5·6 | 7 | 0·35 | 0·30 |
| 56·5 | ·458 | 5·0 | 3·2 | 60·6 | 520·0 | 7·25 | 7·75 | 5·75 | 10·25 | 0·00 | ... | ... | 7·0 | 5·0 | 8 | 1·36 | 1·27 |
| 52·4 | ·394 | 4·4 | 2·8 | 61·3 | 524·0 | 12·50 | 7·25 | 3·25 | 8·00 | 0·00 | ... | 211·8 | 7·6 | 6·0 | 7 | 1·50 | 1·40 |
| 50·6 | ·360 | 4·1 | 2·2 | 65·5 | 530·2 | 3·75 | 7·50 | 9·25 | 9·50 | 0·00 | ... | 176·7 | 5·6 | 4·6 | 11 | 2·41 | 2·26 |
| 46·5 | ·315 | 3·6 | 1·1 | 75·2 | 533·3 | 4·50 | 4·25 | 8·00 | 14·25 | 0·00 | ... | 205·3 | 6·8 | 3·2 | 18 | 3·09 | 2·88 |
| 40·5 | ·252 | 2·9 | 0·5 | 85·6 | 543·9 | 6·75 | 3·50 | 7·00 | 12·75 | 0·00 | ... | 157·9 | 6·7 | 1·0 | 11 | 1·21 | 1·08 |
| 33·2 | ·191 | 2·2 | 0·2 | 93·1 | 557·5 | 12·25 | 6·25 | 4·75 | 7·75 | 0·00 | ... | 157·4 | 8·3 | 1·7 | 14 | 2·57 | 2·38 |
| 44·1 | ·283 | 3·7 | 2·4 | 74·1 | 538·9 | 93·25 | 77·75 | 81·00 | 113·00 | 0·00 | ... | 190·9 | 7·1 | 3·8 | 111 | 17·13 | 16·02 |

Long. 4° 5′ W. Height above Sea 35 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 38·4 | ·231 | 2·7 | 0·5 | 82·7 | 548·1 | 6·75 | 8·25 | 6·75 | 9·25 | 0·00 | ... | 285·8 | 7·5 | 4·2 | 18 | 3·62 | 3·29 |
| 36·9 | ·219 | 2·5 | 0·5 | 84·6 | 547·5 | 5·25 | 10·75 | 6·25 | 5·75 | 0·00 | ... | 336·0 | 8·1 | 3·9 | 12 | 3·34 | 3·08 |
| 38·7 | ·237 | 2·7 | 0·8 | 76·7 | 546·4 | 8·00 | 10·50 | 5·25 | 7·25 | 0·00 | ... | 232·9 | 7·4 | 3·9 | 9 | 2·45 | 2·28 |
| 44·2 | ·289 | 3·3 | 1·4 | 69·0 | 539·6 | 4·75 | 6·00 | 8·00 | 10·75 | 0·50 | ... | 197·0 | 5·4 | 4·6 | 3 | 0·21 | 0·18 |
| 48·7 | ·345 | 3·8 | 1·3 | 71·0 | 532·7 | 4·75 | 8·00 | 10·50 | 7·75 | 0·00 | ... | 237·0 | 6·1 | 5·2 | 8 | 1·57 | 1·43 |
| 54·1 | ·420 | 4·6 | 2·5 | 64·4 | 525·9 | 5·25 | 4·75 | 8·25 | 11·75 | 0·00 | ... | 174·5 | 6·2 | 5·4 | 5 | 0·39 | 0·31 |
| 58·2 | ·484 | 5·3 | 2·6 | 66·2 | 519·5 | 4·75 | 9·00 | 6·25 | 10·50 | 0·50 | ... | 187·1 | 6·0 | 4·5 | 11 | 1·87 | 1·71 |
| [illegible] | ·429 | 4·7 | 3·1 | 60·0 | 520·4 | 6·75 | 7·25 | 6·50 | 10·00 | 0·50 | ... | 168·0 | 5·6 | 5·6 | 9 | 1·81 | 1·67 |
| 54·5 | ·426 | 4·7 | 2·0 | 70·1 | 526·1 | 1·25 | 10·25 | 7·75 | 9·75 | 1·00 | ... | 156·9 | 6·1 | 4·0 | 9 | 1·51 | 1·40 |
| 50·1 | ·365 | 4·0 | 1·1 | 78·0 | 529·1 | 1·75 | 5·75 | 7·00 | 15·50 | 1·00 | ... | 275·9 | 6·8 | 2·1 | 20 | 5·11 | 4·63 |
| 42·0 | ·267 | 3·0 | 0·6 | 83·9 | 540·1 | 4·75 | 9·75 | 6·50 | 7·50 | 1·50 | ... | 159·4 | 7·5 | 3·4 | 17 | 2·77 | 2·51 |
| 32·9 | ·188 | 2·2 | 0·5 | 83·1 | 552·5 | 7·25 | 12·50 | 2·50 | 7·25 | 1·50 | ... | 187·0 | 7·5 | 3·1 | 9 | 3·01 | 2·86 |
| 46·1 | ·325 | 3·6 | 1·4 | 74·1 | 535·7 | 61·25 | 103·75 | 79·50 | 113·00 | 6·50 | ... | 216·4 | 6·7 | 4·1 | 130 | 27·56 | 25·35 |

Long. 1° 19′ E. Height above Sea 325 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33·6 | ·193 | 2·2 | 0·6 | 80·5 | ... | 5·25 | 8·75 | 7·50 | 9·50 | 0·00 | ... | ... | 6·0 | 4·5 | 15 | 2·68 | ... |
| 29·8 | ·166 | 1·9 | 0·5 | 78·8 | ... | 2·00 | 11·75 | 8·25 | 6·00 | 0·00 | ... | ... | 7·6 | 4·6 | 3 | 0·26 | ... |
| 33·9 | ·195 | 2·3 | 0·7 | 77·4 | ... | 8·25 | 11·50 | 4·00 | 7·25 | 0·00 | ... | ... | 7·4 | 4·7 | 19 | 1·93 | ... |
| 41·8 | ·266 | 3·0 | 1·3 | 69·8 | ... | 4·50 | 6·50 | 7·25 | 11·25 | 0·50 | ... | ... | 3·0 | 4·8 | 6 | 0·35 | ... |
| 45·6 | ·307 | 3·5 | 1·4 | 71·0 | ... | 5·00 | 9·50 | 7·75 | 8·75 | 0·00 | ... | ... | 4·6 | 5·3 | 7 | 0·97 | ... |
| 56·4 | ·455 | 5·0 | 1·0 | 84·2 | ... | 6·25 | 3·00 | 9·75 | 12·00 | 0·00 | ... | ... | 4·7 | 4·6 | 6 | 0·52 | ... |
| 58·8 | ·496 | 5·5 | 1·5 | 78·0 | ... | 3·25 | 11·25 | 6·25 | 10·25 | 0·00 | ... | ... | 5·5 | 4·3 | 10 | 1·18 | ... |
| 55·9 | ·449 | 5·0 | 1·6 | 75·0 | ... | 9·50 | 6·75 | 5·50 | 9·25 | 0·00 | ... | ... | 5·7 | 4·5 | 10 | 1·08 | ... |
| 53·5 | ·410 | 4·6 | 1·3 | 78·2 | ... | 2·00 | 12·75 | 6·75 | 8·50 | 0·00 | ... | ... | 4·2 | 5·1 | 10 | 1·67 | ... |
| 48·9 | ·344 | 3·9 | 0·8 | 82·4 | ... | 4·75 | 6·00 | 5·00 | 15·25 | 0·09 | ... | ... | 5·7 | 4·5 | 19 | 3·22 | ... |
| 39·6 | ·243 | 2·8 | 0·6 | 81·5 | ... | 8·00 | 7·50 | 4·00 | 10·50 | 0·00 | ... | ... | 6·3 | 4·2 | 15 | 3·72 | ... |
| 30·4 | ·170 | 2·0 | 0·4 | 80·4 | ... | 6·75 | 13·50 | 3·75 | 7·00 | 0·00 | ... | ... | 7·6 | 4·7 | 14 | 3·39 | ... |
| 44·0 | ·308 | 3·5 | 1·0 | 8·1 | ... | 65·50 | 108·75 | 74·75 | 115·50 | 0·50 | ... | ... | 5·7 | 4·6 | 13·4 | 1·75 | ... |

Appendix

## GUERNSEY. Lat. 49° 33′ N.

| Month. | Readings of the Barometer. | | | Temperature of the Air. | | | | | | | Mean Daily Readings of | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Mean | | | | | | Hygrometer. | |
| | Mean reduced and corrected to 32°. | Highest reduced and corrected to 32°. | Lowest reduced and corrected to 32°. | Highest during Month. | Lowest during Month. | Range during Month. | Of all the highest. | Of all the lowest. | Daily Range. | Approximate Temperature. | Maximum in Sun's rays. | Minimum on Grass. | Dry Bulb. | Wet Bulb. |
| January ... ... | 29·723 | 30·247 | 29·067 | 53·1* | 15·0* | 38·1* | 45·9* | 27·7* | 18·2* | 36·8* | 68·1 | ... | 43·4 | 41·5 |
| February ... ... | 29·539 | 29·935 | 29·152 | 56·4† | 21·0† | 35·4† | 44·4† | 29·6† | 14·8† | 37·0† | 74·4 | 29·1 | 40·8 | 39·5 |
| March ... ... ... | 29·774 | 30·175 | 29·214 | 61·9 | 27·6 | 34·3 | 47·9 | 32·8 | 15·1 | 40·3 | 95·9 | 32·0 | 43·6 | 41·8 |
| April ... ... ... | 29·915 | 30·240 | 29·260 | 70·0 | 29·6 | 40·4 | 60·3 | 34·7 | 25·6 | 47·5 | 124·1 | 34·6 | 52·8 | 49·7 |
| May ... ... ... | 29·815 | 30·101 | 29·168 | 81·2 | 29·9 | 51·3 | 63·6 | 37·9 | 25·7 | 50·7 | 130·0 | 39·6 | 56·6 | 53·3 |
| June .. .. ... | 29·908 | 30·207 | 29·574 | 79·0 | 36·9 | 42·1 | 69·8 | 42·0 | 27·8 | 55·9 | Broken | Useless | 61·7 | 57·7 |
| July ... ... ... | 29·748 | 30·047 | 29·437 | 79·3 | 37·8 | 41·5 | 72·0 | 45·8 | 26·2 | 58·9 | 118·2‡ | ,, | 64·4 | 61·7 |
| August... ... ... | 29·734 | 30·033 | 29·425 | 77·7 | § | ... | 70·1 | ... | ... | ... | 118·0 | ,, | 63·3 | 60·1 |
| September ... ... | 29·812 | 30·209 | 29·114 | 72·1 | 53·0 | 19·1 | 66·7‖ | 55·1‖ | 11·6‖ | 60·9‖ | 112·4 | 47·2 | 62·0 | 59·0 |
| October ... ... | 29·560 | 30·185 | 28·846 | 70·4 | 44·0 | 29·4 | 61·0 | 48·9 | 12·1 | 54·9 | 97·8 | 42·2 | 56·4 | 53·5 |
| November ... ... | 29·557 | 30·230 | 28·971 | 59·7 | 34·9 | 24·8 | 51·8 | 42·1 | 9·7 | 46·9 | 78·1 | 35·1 | 47·9 | 44·7 |
| December ... ... | 29·612 | 30·280 | 28·928 | 55·4 | 19·2 | 36·2 | 44 0 | 33·7 | 10·3 | 38·8 | 62·3 | 28·1 | 39·6 | 37·7 |
| Yearly Sums, Means, and Totals ... | 29·725 | 30·191 | 29·096 | | | | Means useless. | | | | | | 52·7 | 50·0 |

## JERSEY. Lat. 49° 11′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | 29·947 | 30·453 | 29·285 | 54·0 | 24·0 | 30·0 | 46·6 | 34·2 | 12·4 | 40·4 | ... | ... | 42·7 | 40·8 |
| February ... ... | 29·760 | 30·161 | 29·405 | 55·2 | 21·8 | 33·4 | 45·4 | 31·2 | 14·2 | 38·3 | ... | ... | 40·6 | 39·0 |
| March ... ... ... | 29·957 | 30·377 | 29·414 | 63·2 | 26·2 | 37·0 | 50·5 | 33·7 | 16·8 | 42·1 | ... | ... | 45·2 | 42·7 |
| April ... ... ... | 30·112 | 30·418 | 29·474 | 71·2 | 30·8 | 40·4 | 62·4 | 38·0 | 24·4 | 50·2 | ... | ... | 55·6 | 50·9 |
| May ... ... ... | 30·019 | 30·286 | 29·426 | 83·2 | 32·8 | 50·4 | 67·3 | 42·6 | 24·7 | 54·9 | ... | ... | 60·3 | 55·1 |
| June ... ... ... | 30·105 | 30·393 | 29·729 | 86·2 | 40·0 | 46·2 | 73·4 | 48·2 | 25·2 | 60·8 | ... | ... | 66·1 | 60·0 |
| July ... ... ... | 29·939 | 30·459 | 29·050 | 88·2 | 44·0 | 44·2 | 77·2 | 53·7 | 23·5 | 65·4 | ... | ... | 68·3 | 63·3 |
| August ... ... ... | 29·882 | 30·175 | 29·456 | 81·0 | 43·8 | 37·2 | 74·4 | 52·5 | 21·9 | 63·4 | ... | ... | 66·4 | 61·4 |
| September ... ... | 29·968 | 30·353 | 29·281 | 77·0 | 44·0 | 33·0 | 71·7 | 49·4 | 22·3 | 60·5 | ... | ... | 63·1 | 58·8 |
| October ... ... ... | 29·704 | 30·307 | 28·955 | 75·2 | 38·5 | 36·7 | 66·3 | 46·5 | 19·8 | 56·4 | ... | ... | 57·3 | 54·8 |
| November ... ... | 29·726 | 30·434 | 29·184 | 60·5 | 30·0 | 30·5 | 54·4 | 38·7 | 15·7 | 46·5 | ... | ... | 47·7 | 47·0 |
| December ... ... | 29·813 | 30·491 | 29·188 | 58·0 | 17·0 | 41·0 | 44·4 | 28·9 | 15·5 | 36·6 | ... | ... | 37·7 | 36·3 |
| Yearly Sums, Means, and Totals ... | 29·911 | 30·359 | 29·321 | 71·0 | 32·7 | 38·3 | 61·2 | 41·5 | 19·7 | 51·3 | ... | ... | 54·3 | 51·8 |

## NETLEY. Lat. 50° 51′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | 29·939 | 30·501 | 29·106 | 53·0 | 19·0 | 34·0 | 45·4 | 33·1 | 12·3 | 39·2 | 58·8 | 29·7 | 40·6 | 39·9 |
| February ... ... | 29·798 | 30·291 | 29·383 | 56·0 | 19·0 | 37·0 | 42·8 | 30·1 | 12·7 | 36·4 | 61·9 | 27·0 | 38·7 | 36·8 |
| March ... ... ... | 30·003 | 30·523 | 29·458 | 61·0 | 20·0 | 41·0 | 48·9 | 32·2 | 16·7 | 40·5 | 77·6 | 28·9 | 43·1 | 40·3 |
| April ... ... ... | 30·152 | 30·493 | 29·405 | 74·8 | 23·2 | 51·6 | 61·6 | 33·5 | 28·1 | 47·5 | 104·2 | 28·4 | 54·4 | 49·5 |
| May ... ... ... | 30·019 | 30·357 | 29·403 | 79·0 | 28·6 | 50·4 | 66·1 | 39·4 | 26·7 | 52·7 | 105·0 | 35·9 | 57·8 | 53·1 |
| June ... ... ... | 30·089 | 30·588 | 29·723 | 87·5¶ | 42·2¶ | 45·3¶ | 76·3¶ | 49·2¶ | 27·1¶ | 62·8¶ | 101·9 | 45·8 | 66·9 | 59·6 |
| July ... ... .. | 29·946 | 30·267 | 29·614 | 93·0 | 45·2 | 47·8 | 78·5 | 56·1 | 22·4 | 67·3 | 116·0 | 53·3 | 70·7 | 63·0 |
| August ... ... ... | 29·919 | 30·225 | 29·465 | 81·0 | 41·0 | 40·0 | 73·2 | 51·9 | 21·3 | 62·5 | 111·5 | 49·6 | 66·4 | 60·6 |
| September ... ... | 30·019 | 30·509 | 29·239 | 74·0 | 39·0 | 35·0 | 67·6 | 47·3 | 20·3 | 57·4 | 101·0 | 45·4 | 61·5 | 57·8 |
| October... ... ... | 29·716 | 30·528 | 28·955 | 77·8 | 29·5 | 48·3 | 60·4 | 43·1 | 17·3 | 51·7 | 79·6 | 41·0 | 54·6 | 51·6 |
| November ... ... | 29·770 | 30·497 | 29·129 | 67·0 | 23·5 | 43·5 | 52·1 | 35·7 | 16·4 | 43·9 | 61·0 | 33·3 | 44·7 | 42·5 |
| December ... ... | 29·864 | 30·582 | 29·057 | 55·0 | 14·0 | 41·0 | 41·5 | 28·2 | 13·3 | 34·8 | 50·1 | 26·3 | 34·4 | 33·3 |
| Yearly Sums, Means, and Totals ... | 29·936 | 30·463 | 29·328 | 71·6 | 28·7 | 42·9 | 59·5 | 40·0 | 19·5 | 49·7 | 85·7 | 37·0 | 52·8 | 49·0 |

* For 28 days only. † For 23 days only. ‡ Maximum in July, 24 days only.
§ Minimum in August out of order. ‖ For 11 days only. ¶ For 22 days only.

No. XXII—*continued.*

Long. 2° 40′ W. Height above Sea 248 feet.

| Hygrometrical Results from Glaisher's Tables (3rd edition) | | | | | | Atmospherical Conditions. | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | In a Cubic Foot of Air. | | | | Number of Days for mean Direction of Wind. | | | | | Calculated from Robinson's Anemometer. | | | | | Amount of Rain fall. |
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean Degree of Humidity. | Mean Weight of Cubic Foot of Air. | North. | East. | South. | West. | Number of calm, or nearly calm, Days. | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of Days on which Rain fell. | On the Ground. | Feet above the Ground. |
| | | | | | | | | | | | lbs. per sq. foot | Miles | | | | Inches | Inches |
| 39·3 | ·240 | 2·8 | 0·5 | 85·2 | 547·2 | 4·50 | 9·25 | 7·50 | 9·75 | 0·00 | ... | ... | 6·0 | 5·6 | 18 | 2·14 | ... |
| 37·9 | ·228 | 2·7 | 0·3 | 89·6 | 546·6 | 4·50 | 9·50 | 7·75 | 6·25 | 0·00 | ... | ... | 6·4 | 6·2 | 9 | 1·39 | ... |
| 38·9 | ·245 | 2·8 | 0·5 | 86·2 | 547·9 | 15·00 | 5·50 | 3·50 | 7·00 | 0·00 | ... | ... | 5·7 | 5·4 | 8 | 2·00 | ... |
| 46·6 | ·319 | 3·6 | 0·9 | 80·2 | 540·2 | 7·50 | 6·75 | 4·75 | 11·00 | 0·00 | ... | 397·1 | 3·4 | 5·1 | 4 | 0·65 | ... |
| 50·2 | ·314 | 4·1 | 1·0 | 79·2 | 539·9 | 8·25 | 7·75 | 5·75 | 9·25 | 0·00 | ... | 300·0 | 3·5 | 5·5 | 7 | 1·27 | ... |
| 54·3 | ·422 | 4·7 | 1·5 | 77·0 | 530·0 | 9·75 | 1·75 | 3·00 | 15·00 | 0·50 | ... | 318·0 | 4·3 | 5·3 | 2 | 0·03 | ... |
| 59·4 | ·509 | 5·6 | 1·1 | 84·2 | 524·0 | 10·25 | 2·75 | 3·75 | 13·75 | 0·50 | ... | 325·1 | 4·4 | 5·4 | 5 | 1·12 | ... |
| 57·4 | ·473 | 5·2 | 1·2 | 81·1 | 525·0 | 15·00 | 4·00 | 4·00 | 8·00 | 0·00 | ... | 320·4 | 3·9 | 5·4 | 5 | 0·99 | ... |
| 56·4 | ·456 | 5·1 | 1·1 | 82·0 | 527·9 | 8·25 | 7·25 | 6·50 | 8·00 | 0·00 | ... | 319·3 | 3·9 | 5·1 | 9 | 0·94 | ... |
| 50·8 | ·372 | 4·2 | 0·9 | 81·6 | 529·7 | 6·25 | 3·50 | 8·75 | 12·50 | 0·00 | ... | 493·7 | 6·0 | 4·7 | 17 | 3·94 | ... |
| 41·2 | ·259 | 3·0 | 0·8 | 78·5 | 539·4 | 7·50 | 6·00 | 8·75 | 7·75 | 0·00 | ... | 398·0 | 6·1 | 4·9 | 17 | 3·20 | ... |
| 35·2 | ·206 | 2·4 | 0·5 | 84·8 | 549·6 | 10·75 | 10·50 | 5·50 | 4·25 | 0·00 | ... | 469·9 | 6·3 | 5·2 | 13 | 3·42 | ... |
| 47·4 | ·341 | 3·8 | 0·8 | 82·5 | 537·3 | 107·50 | 74·50 | 69·50 | 112·50 | 1·00 | ... | ... | 5·0 | 5·3 | 114 | 22·00 | ... |

Long. 2° 6′ W. Height above Sea 72 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 38·6 | ·234 | 2·7 | 0·5 | 85·7 | 552·0 | 5·75 | 12·50 | 9·25 | 3·50 | 0·00 | ... | ... | 5·0 | 6·5 | 19 | 1·66 | ... |
| 37·0 | ·219 | 2·5 | 0·4 | 87·2 | 551·1 | 7·50 | 8·50 | 7·00 | 5·00 | 0·00 | ... | ... | 5·6 | 6·3 | 12 | 1·30 | ... |
| 39·8 | ·245 | 2·8 | 0·6 | 81·7 | 549·4 | 13·25 | 8·50 | 3·50 | 5·75 | 0·00 | ... | ... | 7·2 | 6·8 | 14 | 1·63 | ... |
| 46·5 | ·318 | 3·6 | 1·3 | 71·5 | 540·7 | 5·75 | 6·75 | 5·75 | 11·75 | 0·00 | ... | ... | 2·7 | 6·5 | 2 | 0·17 | ... |
| 50·5 | ·368 | 4·1 | 1·8 | 70·0 | 533·8 | 8·25 | 6·50 | 8·75 | 7·50 | 0·00 | ... | ... | 2·5 | 6·4 | 6 | 0·70 | ... |
| 55·0 | ·433 | 4·8 | 2·2 | 67·6 | 511·6 | 12·50 | 3·00 | 3·75 | 10·75 | 0·00 | ... | ... | 2·6 | 6·2 | 3 | 0·05 | ... |
| 59·4 | ·406 | 5·6 | 2·0 | 73·0 | 523·5 | 5·50 | 5·50 | 5·75 | 14·25 | 0·00 | ... | ... | 4·6 | 6·2 | 6 | 1·32 | ... |
| 57·4 | ·472 | 5·2 | 1·9 | 73·4 | 524·6 | 9·25 | 7·25 | 2·75 | 10·25 | 1·50 | ... | ... | 3·0 | 6·4 | 10 | 1·25 | ... |
| 56·[illegible] | ·463 | 5·1 | 1·4 | 79·4 | 529·3 | 4·25 | 12·25 | 2·50 | 10·50 | 0·50 | ... | ... | 4·3 | 6·3 | 7 | 1·88 | ... |
| 52·6 | ·396 | 4·4 | 0·8 | 84·3 | 531·1 | 1·50 | 6·00 | 5·50 | 17·00 | 1·00 | ... | ... | 5·2 | 7·1 | 20 | 5·72 | ... |
| 46·2 | ·313 | 4·6 | 0·2 | 95·1 | 542·2 | 4·75 | 9·75 | 6·00 | 8·00 | 1·50 | ... | ... | 6·3 | 5·7 | 18 | 4·53 | ... |
| 34·4 | ·199 | 2·3 | 0·3 | 88·1 | 555·5 | 6·25 | 14·00 | 6·00 | 4·75 | 0·00 | ... | ... | 6·3 | 5·7 | 16 | 3·47 | ... |
| 47·8 | ·339 | 3·9 | 1·1 | 79·7 | 537·0 | 84·50 | 100·50 | 66·50 | 109·00 | 4·50 | ... | ... | 4·6 | 6·3 | 133 | 23·68 | ... |

Long. 1° 20′ W. Height above Sea 47 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 39·0 | ·238 | 2·8 | 0·1 | 94·4 | 554·2 | 6·25 | 5·00 | 8·00 | 7·75 | 4·00 | ... | 252·6 | 7·6 | 3·2 | 11 | 1·28 | 0·87 |
| 34·2 | ·198 | 2·3 | 0·5 | 85·2 | 553·9 | 6·50 | 6·00 | 7·75 | 6·25 | 1·50 | ... | 273·4 | 8·2 | 3·0 | 10 | 2·38 | 1·75 |
| 36·9 | ·220 | 2·5 | 0·7 | 79·1 | 552·8 | 12·25 | 7·25 | 4·00 | 7·50 | 0·00 | ... | 237·0 | 6·7 | 3·5 | 3 | 1·22 | 1·11 |
| 44·6 | ·296 | 3·4 | 1·4 | 69·5 | 544·9 | 5·75 | 2·75 | 9·75 | 11·75 | 0·00 | ... | 220·7 | 4·1 | 2·6 | 3 | 0·65 | 0·13 |
| 48·8 | ·346 | 3·8 | 1·5 | 71·6 | 536·8 | 5·00 | 4·50 | 10·50 | 11·00 | 0·00 | ... | 280·0 | 6·0 | 2·6 | 4 | 1·20 | 1·01 |
| 53·7 | ·414 | 4·6 | 2·7 | 72·8 | 528·1 | 6·75 | 2·50 | 6·00 | 14·75 | 0·00 | ... | 219·3 | 6·1 | 2·5 | 2 | 0·21 | 0·18 |
| 57·1 | ·467 | 5·1 | 3·1 | 62·2 | 521·6 | 7·50 | 4·75 | 8·75 | 10·00 | 0·00 | ... | 202·0 | 5·1 | 2·6 | 5 | 0·87 | 0·79 |
| 55·9 | ·448 | 4·4 | 2·2 | 69·4 | 525·5 | 12·00 | 4·75 | 4·75 | 9·50 | 0·00 | ... | 207·2 | 7·1 | 3·8 | 8 | 0·83 | 0·69 |
| 54·6 | ·427 | 4·7 | 1·4 | 78·5 | 532·2 | 4·50 | 5·75 | 11·75 | 8·00 | 0·00 | ... | 211·0 | 6·4 | 3·7 | 9 | 1·88 | 1·52 |
| 48·7 | ·343 | 3·9 | 0·9 | 80·0 | 534·4 | 7·50 | 3·75 | 7·50 | 12·25 | 0·00 | ... | 317·0 | 7·5 | 4·0 | 18 | 3·31 | 2·21 |
| 39·9 | ·247 | 2·8 | 0·5 | 83·8 | 546·7 | 9·00 | 4·25 | 8·25 | 8·50 | 0·00 | ... | 153·0 | 7·5 | 3·5 | 8 | 1·56 | 1·15 |
| 31·4 | ·177 | 2·1 | 0·3 | 88·4 | 560·3 | 14·50 | 7·00 | 2·50 | 7·00 | 0·00 | ... | 153·0 | 8·5 | 3·5 | 12 | 3·26 | 2·60 |
| 45·4 | ·318 | 3·5 | 1·3 | 77·1 | 540·8 | 97·50 | 58·25 | 89·50 | 114·25 | 5·50 | ... | 227·3 | 6·6 | 3·2 | 93 | 18·65 | 14·01 |

Appendix

PARKHURST, ISLE OF WIGHT. Lat. 50° 43′ N.

| Month. | Readings of the Barometer. | | | Temperature of the Air. | | | | | | | Mean Daily Readings of | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean reduced and corrected to 32°. | Highest reduced and corrected to 32°. | Lowest reduced and corrected to 32°. | Highest during Month. | Lowest during Month. | Range during Month. | Mean | | | | Maximum in Sun's rays. | Minimum on Grass. | Hygrometer | |
| | | | | | | | Of all the highest. | Of all the lowest. | Daily Range. | Approximate Temperature. | | | Dry Bulb. | Wet Bulb. |
| January ... ... | ... | ... | ... | 57·4 | 19·0 | 38·4 | 45·0 | 32·5 | 12·5 | 38·7 | 56·9 | 31·7 | 41·3 | 39·6 |
| February ... ... | ... | ... | ... | 59·4 | 20·0 | 39·4 | 42·4 | 29·6 | 12·8 | 36·0 | 58·8 | 28·9 | 39·1 | 38·1 |
| March ... ... | ... | ... | ... | 60·4 | 19·4 | 41·0 | 48·9 | 31·3 | 17·6 | 40·1 | 76·2 | 30·6 | 44·2 | 41·1 |
| April ... ... | ... | ... | ... | 74·0 | 24·0 | 50·0 | 61·3 | 33·6 | 27·7 | 47·4 | 106·6 | 31·9 | 51·0 | 49·0 |
| May ... ... | ... | ... | ... | 80·0 | 28·0 | 52·0 | 65·3 | 39·1 | 26·2 | 52·2 | 109·2 | 37·8 | 58·0 | 53·2 |
| June ... ... | ... | ... | ... | 88·0 | 64·0 | 24·0 | 73·3 | 47·1 | 26·2 | 60·2 | 116·7 | 46·8 | 66·0 | 59·8 |
| July ... ... | ... | ... | ... | 88·0 | 40·0 | 48·0 | 76·5 | 52·3 | 24·2 | 64·4 | 121·2 | 51·7 | 69·4 | 63·5 |
| August ... ... | ... | ... | ... | 82·0 | 39·0 | 43·0 | 73·5 | 48·1 | 25·4 | 60·8 | 116·0 | 46·4 | 66·4 | 61·1 |
| September ... ... | ... | ... | .. | 74·0 | 36·0 | 38·0 | 67·9 | 45·2 | 22·7 | 56·5 | 101·5 | 42·6 | 62·0 | 59·0 |
| October ... ... | ... | ... | ... | 70·0 | 27·0 | 43·0 | 61·1 | 42·1 | 19·0 | 51·6 | 71·3 | 38·8 | 56·5 | 54·2 |
| November ... ... | ... | ... | ... | 58·0 | 25·0 | 33·0 | 50·6 | 32·5 | 18·1 | 41·5 | 57·3 | 29·3 | 46·1 | 44·8 |
| December ... ... | ... | ... | ... | 60·0 | 11·0 | 49·0 | 39·3 | 25·8 | 13·5 | 32·5 | 44·5 | 23·8 | 35·2 | 34·0 |
| Yearly Sums, Means, and Totals ... | ... | ... | ... | 70·9 | 29·4 | 41·5 | 58·8 | 38·3 | 20·5 | 48·5 | 86·4 | 36·7 | 53·2 | 49·8 |

PORTSMOUTH. Lat. 50° 45′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | 30·013 | 30·668 | 29·213 | 51·5 | 24·0 | 27·5 | 45·7 | 33·8 | 11·9 | 39·7 | 59·1 | 24·3 | 41·3 | 38·8 |
| February ... ... | 29·848 | 30·392 | 29·439 | 59·8 | 19·5 | 40·3 | 46·1 | 30·1 | 16·0 | 38·1 | 63·0 | 23·9 | 38·6 | 36·4 |
| March ... ... | 30·045 | 30·505 | 29·531 | 61·4 | 25·8 | 35·6 | 49·5 | 33·0 | 16·5 | 41·2 | 79·9 | 27·8 | 43·1 | 39·5 |
| April ... ... | 30·180 | 30·507 | 29·515 | 71·6 | 23·3 | 48·3 | 60·3 | 36·7 | 23·6 | 48·5 | 104·5 | 30·1 | 53·3 | 46·9 |
| May ... ... | 30·090 | 30·424 | 29·423 | 78·6 | 31·9 | 46·7 | 64·8 | 42·3 | 22·5 | 53·5 | 114·1 | 37·3 | 57·0 | 50·8 |
| June ... ... | 30·148 | 30·522 | 29·776 | 84·0 | 45·0 | 39·0 | 70·4 | 50·7 | 19·7 | 60·5 | 121·9 | 45·5 | 65·6 | 57·6 |
| July ... ... | 30·008 | 30·226 | 29·632 | 85·3 | 43·9 | 41·4 | 76·0 | 55·0 | 21·0 | 65·5 | 115·2 | 49·8 | 69·4 | 61·9 |
| August ... ... | 29·888 | 30·429 | 29·515 | 82·8 | 35·6 | 47·2 | 75·3 | 50·2 | 25·1 | 62·7 | 115·8 | 45·2 | 66·1 | [illegible] |
| September ... | 30·078 | 30·614 | 29·332 | 76·2 | 35·2 | 41·0 | 70·5 | 41·7 | 28·8 | 56·1 | 104·2 | 33·5 | 62·8 | 56·0 |
| October ... ... | 29·785 | 30·504 | 28·942 | 76·2 | 25.2 | 51·0 | 61·3 | 37·3 | 24·0 | 49·3 | 91·6 | 29·2 | 54·8 | 50·3 |
| November ... ... | 29·812 | 30·512 | 29·184 | 60·2 | 24·2 | 36·0 | 52·1 | 33·0 | 19·1 | 42·5 | 68·2 | 26·4 | 46·0 | 42·6 |
| December ... ... | 29·899 | 30·625 | 29·132 | 58·2 | 15·4 | 42·8 | 40·6 | 27·8 | 12·8 | 34·2 | 46·4 | 23,8 | 36·2 | 34·3 |
| Yearly Sums, Means, and Totals ... | 29·983 | 30·494 | 29·386 | 70·5 | 29·1 | 41·4 | 59·4 | 39·3 | 20·1 | 49·3 | 90·3 | 33·1 | 52·0 | 47·9 |

PRESTON. Lat. 53° 45′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | ... | ... | ... | 64·5 | 15·0 | 49·5 | 64·0 | 28·6 | 35·4 | 46·3 | ... | ... | 37·9 | 37·2 |
| February ... ... | ... | ... | ... | 65·5 | 18·0 | 47·5 | 64·1 | 29·0 | 35·1 | 46·5 | ... | ... | 38·5 | 37·2 |
| March ... ... | ... | ... | ... | 65·0 | 21·0 | 44·0 | 64·1 | 31·1 | 33·0 | 47·6 | ... | ... | 41·0 | 39·4 |
| April ... ... | .. | .. | ... | 76·0 | 30·0 | 46·0 | 67·0 | 35·1 | 31·9 | 51·0 | ... | ... | 50·8 | 46·6 |
| May ... ... | ... | ... | ... | 72·0 | 28·0 | 44·0 | 63·4 | 37·4 | 26·0 | 50·4 | ... | ... | 55·5 | 51·1 |
| June ... ... | ... | ... | ... | 77·0 | 30·0 | 47·0 | 68·6 | 42·3 | 26·3 | 55·4 | ... | ... | 60·6 | 57·6 |
| July ... ... | ... | ... | ... | 87·0 | 34·0 | 53·0 | 73·4 | 47·7 | 25·7 | 60·5 | ... | ... | 65·8 | 63·9 |
| August ... ... | ... | ... | ... | 85·0 | 30·0 | 55·0 | 78·2 | 42·6 | 35·6 | 60·4 | ... | ... | 65·5 | 64·0 |
| September ... | ... | ... | ... | 75·0 | 32·0 | 43·0 | 70·4 | 41·3 | 29·1 | 55·8 | ... | ... | 59·2 | 58·1 |
| October ... ... | ... | ... | ... | 74·0 | 15·0 | 59·0 | 63·2 | 33·4 | 29·8 | 48·3 | ... | ... | 50·5 | 49·5 |
| November ... ... | ... | ... | ... | 57·0 | 17·0 | 40·0 | 53·3 | 29·1 | 24·2 | 41·2 | ... | ... | 40·8 | 39·8 |
| December ... ... | ... | ... | ... | 62·0 | 5·0 | 57·0 | 52·3 | 21·7 | 30·6 | 37·0 | ... | ... | 32·8 | 32·0 |
| Yearly Sums, Means, and Totals ... | ... | ... | ... | 71·7 | 22·9 | 48·8 | 65·1 | 34·9 | 30·2 | 50·0 | ... | ... | 49·9 | 48·0 |

No. XXII—*continued.*

Long. 1° 16′ W. Height above Sea 200 feet.

| Hygrometrical Results from Glaisher's Tables (3rd edition). | | | | | | Atmospherical Conditions. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | In a Cubic Foot of Air. | | | Mean Weight of Cubic Foot of Air. | Number of Days for mean Direction of Wind. | | | | Number of calm, or nearly calm, Days. | Calculated from Robinson's Anemometer. | | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of Days on which Rain fell. | Amount of Rain fall. | |
| | | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean Degree of Humidity. | | North. | East. | South. | West. | | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | | | | On the Ground. | Feet above the Ground. |
| | | | | | | | | | | | lbs. per sq. foot | Miles | | | | Inches | |
| 37·5 | ·225 | 2·6 | 0·4 | 87·0 | ... | 4·75 | 9·25 | 6·50 | 10·50 | 0·00 | ... | ... | 7·5 | 4·3 | 14 | 2·56 | ... |
| 36·8 | ·219 | 2·5 | 0·3 | 92·0 | ... | 2·00 | 11·00 | 7·25 | 7·25 | 0·50 | ... | ... | 7·8 | 3·4 | 8 | 2·57 | ... |
| 37·5 | ·224 | 2·6 | 0·7 | 76·5 | ... | 7·25 | 16·00 | 3·00 | 4·75 | 0·00 | ... | ... | 7·0 | 6·8 | 8 | 1·13 | ... |
| 44·1 | ·228 | 3·3 | 1·4 | 69·0 | ... | 7·50 | 9·50 | 3·00 | 10·00 | 0·00 | ... | ... | 5·0 | 5·4 | 4 | 0·43 | ... |
| 48·9 | ·347 | 3·9 | 1·5 | 72·0 | ... | 4·50 | 6·25 | 11·25 | 9·00 | 0·00 | ... | ... | 4·7 | 5·6 | 4 | 1·34 | ... |
| 54·7 | ·428 | 4·7 | 2·3 | 67·2 | ... | 5·50 | 6·75 | 5·00 | 12·75 | 0·00 | ... | ... | 4·7 | 5·4 | 3 | 0·25 | ... |
| 58·9 | ·497 | 5·5 | 2·4 | 68·9 | ... | 5·75 | 6·25 | 9·25 | 9·75 | 0·00 | ... | ... | 5·3 | 5·9 | 7 | 2·39 | ... |
| 56·9 | ·462 | 5·1 | 2·0 | 71·9 | ... | 8·25 | 9·00 | 6·25 | 7·50 | 0·00 | ... | ... | 5·4 | 6·5 | 6 | 1·42 | ... |
| 56·0 | ·449 | 5·0 | 1·3 | 79·5 | ... | 5·25 | 8·00 | 8·75 | 8·00 | 0·00 | ... | ... | 4·6 | 4·9 | 8 | 3·07 | ... |
| 52·5 | ·397 | 4·5 | 0·5 | 88·2 | ... | 8·00 | 4·75 | 4·75 | 13·50 | 0·00 | ... | ... | 6·2 | 6·1 | 15 | 5·13 | ... |
| 43·3 | ·281 | 3·2 | 0·4 | 90·9 | ... | 9·50 | 4·50 | 7·50 | 8·50 | 0·00 | ... | ... | 7·0 | 5·4 | 9 | 2·27 | ... |
| 32·1 | ·182 | 2·1 | 0·3 | 88·4 | ... | 9·00 | 11·25 | 4·00 | 6·75 | 0·00 | ... | ... | 7·0 | 4·3 | 12 | 3·66 | ... |
| 46·6 | ·328 | 3·8 | 1·1 | 79·2 | ... | 77·25 | 102·50 | 76·50 | 108·25 | 0·50 | ... | ... | 6·0 | 5·3 | 98 | 26·92 | ... |

Long. 1° 5′ W. Height above Sea 20 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 35·7 | ·209 | 2·4 | 0·6 | 81·1 | 551·1 | 6·50 | 5·50 | 9·00 | 7·00 | 3·00 | ... | 139·1 | 7·9 | 1·2 | 12 | 1·70 | 1·57 |
| 33·4 | ·192 | 2·2 | 0·5 | 82·6 | 555·0 | 6·75 | 7·25 | 6·50 | 3·00 | 4·50 | ... | 196·8 | 7·0 | 3·1 | 12 | 2·29 | 2·09 |
| 35·2 | ·205 | 2·4 | 0·8 | 73·9 | 553·6 | 12·25 | 6·50 | 2·00 | 6·25 | 4·00 | ... | 173·1 | 6·3 | 2·6 | 10 | 1·28 | 1·12 |
| 40·6 | ·253 | 2·8 | 1·7 | 62·3 | 544·9 | 3·75 | 5·60 | 3·75 | 11·50 | 6·00 | ... | 131·3 | 3·9 | 2·3 | 2 | 0·21 | 0·17 |
| 45·1 | ·302 | 3·4 | 1·8 | 64·2 | 538·9 | 2·50 | 6·50 | 8·50 | 8·00 | 5·50 | ... | 141·5 | 4·4 | 3·5 | 6 | 1·34 | 1·22 |
| 51·1 | ·375 | 4·1 | 2·8 | 59·0 | 530·7 | 7·00 | 2·75 | 2·50 | 15·25 | 2·50 | ... | 148·8 | 5·0 | 2·8 | 2 | 0·30 | 0·22 |
| 56·0 | ·450 | 4·9 | 2·9 | 62·0 | 524·0 | 4·50 | 6·50 | 4·50 | 9·00 | 6·50 | ... | 152·9 | 5·5 | 2·8 | 10 | 1·45 | 1·21 |
| 55·2 | ·436 | 4·8 | 2·2 | 68·1 | 525·2 | 7·75 | 4·25 | 4·00 | 7·50 | 7·50 | ... | 124·2 | 5·5 | 3·3 | 8 | 1·67 | 1·53 |
| 50·[illegible]63 | | 4·0 | 2·3 | 63·8 | 532·3 | 3·25 | 8·25 | 7·25 | 7·25 | 4·00 | ... | 146·9 | 4·1 | 1·8 | 5 | 1·66 | 1·56 |
| 46·0 | ·310 | 3·5 | 1·3 | 71·8 | 535·8 | 4·25 | 4·25 | 6·50 | 12·00 | 4·00 | ... | 184·5 | 6·0 | 1·5 | 18 | 4·10 | 3·70 |
| 38·7 | ·236 | 2·7 | 0·9 | 76·6 | 546·1 | 4·50 | 4·50 | 4·00 | 5·50 | 11·50 | ... | 119·2 | 6·7 | 0·9 | 6 | 1·39 | 1·27 |
| 31·5 | ·178 | 2·0 | 0·5 | 83·3 | 559·0 | 12·00 | 5·50 | 3·75 | 5·25 | 4·50 | ... | 160·7 | 6·3 | 1·2 | 13 | 2·36 | 2·05 |
| 43·2 | ·292 | 3·3 | 1·5 | 70·7 | 540·8 | 75·00 | 66·75 | 62·25 | 97·50 | 63·50 | ... | 151·6 | 5·9 | 3·0 | 104 | 19·75 | 17·71 |

Long. 2° 40′ W. Height above Sea 220 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36·2 | ·213 | 2·6 | 0·1 | 93·7 | ... | 6·50 | 6·50 | 0·50 | 17·50 | 0·00 | ... | ... | 3·5 | 1·3 | 14 | 3·17 | ... |
| 35·4 | ·207 | 2·4 | 0·3 | 89·3 | ... | 5·25 | 6·75 | 2·00 | 10·00 | 4·00 | ... | ... | 3·0 | 2·0 | 9 | 1·10 | ... |
| 37·4 | ·223 | 2·6 | 0·4 | 87·2 | ... | 4·75 | 12·25 | 0·00 | 3·00 | 11·00 | ... | ... | 1·5 | 1·4 | 9 | 3·22 | ... |
| 42·2 | ·270 | 3·1 | 1·1 | 73·6 | ... | 8·00 | 14·00 | 0·00 | 1·00 | 7·00 | ... | ... | 3·1 | 1·8 | 7 | 0·95 | ... |
| 46·9 | ·323 | 3·7 | 1·3 | 73·1 | ... | 6·00 | 11·00 | 0·00 | 7·00 | 7·00 | ... | ... | 2·7 | 1·7 | 6 | 1·83 | ... |
| 55·0 | ·433 | 4·9 | 1·0 | 82·6 | ... | 5·00 | 6·50 | 0·00 | 12·00 | 6·50 | ... | ... | 2·3 | 2·0 | 8 | 1·21 | ... |
| 62·4 | ·564 | 6·2 | 0·8 | 88·6 | ... | 3·00 | 8·50 | 0·00 | 11·50 | 8·00 | ... | ... | 2·7 | 1·8 | 11 | 1·01 | ... |
| 62·8 | ·572 | 6·3 | 0·6 | 91·0 | ... | 6·75 | 17·75 | 0·00 | 0·00 | 6·50 | ... | ... | 2·0 | 2·6 | 9 | 2·74 | ... |
| 57·1 | ·467 | 5·2 | 0·4 | 93·4 | ... | 8·25 | 18·25 | 0·00 | 0·00 | 3·50 | ... | ... | 2·4 | 0·9 | 17 | 2·94 | ... |
| 43·4 | ·341 | 3·8 | 0·3 | 93·0 | ... | 9·50 | 21·50 | 0·00 | 0·00 | 0·00 | ... | ... | 3·1 | 1·7 | 24 | 10·33 | ... |
| 38·6 | ·234 | 2·8 | 0·2 | 92·0 | ... | 7·25 | 22·75 | 0·00 | 0·00 | 0·00 | ... | ... | 2·7 | 0·5 | 15 | 2·96 | ... |
| 30·4 | ·170 | 1·9 | 0·2 | 91·2 | ... | 4·25 | 21·25 | 0·00 | 5·50 | 0·00 | ... | ... | 3·3 | 1·6 | 11 | 2·19 | ... |
| 46·1 | ·343 | 3·8 | 0·6 | 77·4 | ... | 74·50 | 167·00 | 2·50 | 67·50 | 53·50 | ... | ... | 2·7 | 1·6 | 150 | 33·65 | ... |

Appendix

## SHEERNESS. Lat. 51° 23′ N.

| Month. | Readings of the Barometer. Mean reduced and corrected to 32°. | Readings of the Barometer. Highest reduced and corrected to 32°. | Readings of the Barometer. Lowest reduced and corrected to 32°. | Temperature of the Air. Highest during Month. | Temperature of the Air. Lowest during Month. | Temperature of the Air. Range during Month. | Temperature of the Air. Mean. Of all the highest. | Temperature of the Air. Mean. Of all the lowest. | Temperature of the Air. Mean. Daily Range. | Temperature of the Air. Mean. Approximate Temperature. | Mean Daily Readings of. Maximum in Sun's rays. | Mean Daily Readings of. Minimum on Grass. | Mean Daily Readings of. Hygrometer. Dry Bulb. | Mean Daily Readings of. Hygrometer. Wet Bulb. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | ... | ... | ... | 54·0 | 18·0 | 36·0 | 44·7 | 30·1 | 14·6 | 37·4 | ... | ... | 39 0 | 35·4 |
| February ... ... | ... | ... | ... | 52·2 | 15·0 | 37·2 | 42·4 | 28·5 | 13·9 | 35·4 | ... | ... | 39·3 | 35·7 |
| March ... ... ... | ... | ... | ... | 62·0 | 23·0 | 39·0 | 46·0 | 30·1 | 15·9 | 38·0 | ... | ... | 41·2 | 37·6 |
| April ... ... ... | ... | ... | ... | 75·8 | 23·5 | 52·3 | 58·5 | 36·3 | 22·2 | 47·4 | ... | ... | 51·8 | 47·3 |
| May ... ... .. | ... | ... | ... | 83·0 | 30·0 | 53·0 | 64·3 | 39·7 | 24·9 | 52·1 | ... | ... | 57·8 | 54·0 |
| June ... ... ... | ... | ... | ... | 84·2 | 43·5 | 40 7 | 71·8 | 49·1 | 22·7 | 60·4 | ... | ... | 65·5 | 61·1 |
| July ... ... ... | ... | ... | ... | 87·2 | 44·0 | 43·2 | 74·0 | 54·2 | 19·8 | 64·1 | ... | ... | 68·3 | 65·6 |
| August... ... ... | ... | ... | ... | 79·6 | 38·4 | 41·2 | 71·0 | 50·0 | 21·0 | 60·5 | ... | ... | 64·6 | 61·4 |
| September ... ... | ... | ... | ... | 71·5 | 32·0 | 39·5 | 64·9 | 42·8 | 21·6 | 53·6 | ... | ... | 59·6 | 58·0 |
| October... ... ... | ... | ... | ... | 66·4 | 32·2 | 34·2 | 58·1 | 39·9 | 18·2 | 49·0 | ... | ... | 53·7 | 51·8 |
| November ... ... | ... | ... | ... | 56·0 | 20·5 | 35·5 | 48·8 | 32·6 | 16·2 | 40·7 | ... | ... | 44·5 | 42·9 |
| December ... ... | ... | ... | ... | 58·5 | 10·0 | 48·5 | 40·6 | 25·9 | 14·7 | 33·2 | ... | ... | 36·5 | 35·1 |
| Yearly Sums, Means and Totals ... | ... | ... | .. | 69·2 | 17·5 | 41·7 | 57·1 | 38·3 | 18·8 | 47·7 | ... | ... | 51·7 | 48 8 |

## SHORNCLIFFE CAMP. Lat. 51° 5′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | 29·891 | 30·481 | 29·180 | 59·0 | 20·0 | 39·0 | 46·0 | 28·5 | 17·5 | 37·2 | 63·1 | * | 39·4 | 38·0 |
| February ... ... | 29·746 | 30·176 | 28·725 | 51·8 | 14·4 | 37·4 | 43·8 | 27·5 | 16·3 | 35·6 | 68 8 | * | 35·6 | 34·8 |
| March ... ... ... | 29·566 | 30·011 | 28·938 | 55·0 | 18·0 | 37·0 | 45·8 | 24·4 | 21·4 | 35·1 | 83·5 | * | 39·2 | 36·7 |
| April ... ... ... | 30·425 | 30·600 | 29·368 | 72·4 | 29·6 | 42·8 | 60·7 | 35·2 | 25·5 | 47·9 | 109·0 | 32·5 | 52·4 | 48·4 |
| May ... ... ... | † | † | † | 78·4 | 33·2 | 45·2 | 63·8 | 37·9 | 25·9 | 50·8 | 107·9 | 36·6 | 57·0 | 52·0 |
| June ... ... ... | 29·906 | 30·373 | 28·046 | 80·4 | 37·4 | 43·0 | 70·6 | 47·3 | 23·3 | 58·9 | 127·5 | 42·2 | 61·2 | 56·8 |
| July ... ... ... | 29·799 | 30·111 | 29·451 | 85·4 | 40·0 | 45·4 | 76·2 | 49·6 | 26·6 | 62·9 | 129·5 | 43·5 | 66·5 | 63·3 |
| August... ... ... | 29·795 | 30·144 | 29·361 | 80·8 | ... | ... | 74·0 | ... | ... | ... | 127·9 | 36·9 | 63·6 | 60·8 |
| September ... ... | 29·917 | 30·358 | 29·226 | 77·2 | ... | ... | 69·6 | ... | ... | ... | 112·4 | ... | 59·6 | 57·3 |
| October... ... ... | 29·597 | 30·313 | 28·779 | 75·6 | 39·6 | 36·0 | 58·5 | 41·0 | 14·5 | 51·2 | 93·3 | 39·0 | 52·8 | 51·4 |
| November ... ... | 29·651 | 30·391 | 28·987 | 58·2 | 31·0 | 27·2 | 49·2 | 38·2 | 11·0 | 43·7 | 61·9 | 32·9 | 44·7 | 42·9 |
| December ... ... | 29·700 | 30·433 | 29·0c3 | 56·4 | 17·0 | 39·4 | 42·7 | 29·8 | 12·9 | 36·2 | 52·7 | 25·7 | 36·0 | 35·0 |
| Yearly Sums, Means, and Totals ... | 29·818 | 30·302 | 29·013 | ... | ... | ... | ... | ... | ... | ... | 94·8 | ... | 50·1 | 48·1 |

## WOOLWICH. Lat. 51° 29′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | 29·664 | 30·208 | 28·818 | 50·0 | 15·4 | 34·6 | 43·0 | 31·2 | 11·8 | 37·1 | 51·2 | 34·5 | 39·6 | 37·5 |
| February ... ... | 29·545 | 30·604 | 29·076 | 55·7 | 17·9 | 37·8 | 41·9 | 29·2 | 12·7 | 35·5 | 61·8 | 28·5 | 37·6 | 36·0 |
| March ... ... ... | 29·683 | 30·698 | 29·177 | 61·2 | 22·1 | 39·1 | 47·3 | 32·1 | 15·2 | 39·7 | 75·4 | 32·1 | 42·1 | 39·2 |
| April ... ... ... | 29·800 | 30·133 | 29·178 | 79·6 | 20·3 | 59·3 | 62·5 | 34·3 | 28·2 | 48·4 | 114·6 | 33·8 | 54·9 | 48·3 |
| May ... ... ... | 29·627 | 30·439 | 28·995 | 83·0 | 23·7 | 59·3 | 64·7‡ | 37·4‡ | 27·3‡ | 51·0‡ | 113·4 | 38·0 | 59·2 | 52·5 |
| June ... ... ... | 29·857 | 30·274 | 29·356 | 87·2 | 38·2 | 49·0 | 74·7§ | 47·7§ | 26·0§ | 61·2§ | 115·6 | 46·7 | 66·4 | 59·1 |
| July ... ... ... | 29·752 | 30·144 | 29·545 | 87·8 | 39·5 | 48·3 | 76·5 | ...‖ | ...‖ | ...‖ | 113·2 | 52·5 | 70·0 | 63·4 |
| August... ... ... | 29·720 | 30·041 | 29·202 | 80·0 | ... | ... | 71·7 | ... | ... | ... | 112·0 | 49·3 | 65·3 | 61·9 |
| September ... ... | 29·830 | 30·269 | 29·106 | 72·7 | ... | ... | 66·5 | ... | ... | ... | 107·1 | 44·3 | 60·6 | 57·7 |
| October... ... ... | 29·499 | 30·296 | 28·674 | 68·3 | 30·8 | 37·5 | 58·3 | 43·6 | 14·7 | 50·9 | 85·4 | 40·4 | 52·7 | 49·3 |
| November ... ... | 29·552 | 30·248 | 28·917 | 55·3 | 27·6 | 27·7 | 47·3 | 35·3 | 12·0 | 41·3 | 58·6 | 32·1 | 42·7 | 40·7 |
| December ... ... | 29·656 | 30·358 | 28·908 | 56·5 | 8·9 | 47·6 | 37·5 | 27·8 | 9·7 | 32·7 | 41·2 | ... | 34·0 | 33·0 |
| Yearly Sums, Means, and Totals ... | 29·682 | 30·208 | 29·079 | 69·7 | Useless to summarize. | | | | | | 87·5 | 39·3 | 52·1 | 48·2 |

* Useless,
† Barometer out of repair.
‡ For 25 days only.
§ For 17 days only.
‖ Minimum in air out of order.

No. XXII—*continued.*

Long. 0° 49′ E. Below the Sea Level 2 feet.

| Hygrometrical Results from Glaisher's Tables (3rd edition). | | | | | | Atmospherical Conditions. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | In a Cubic Foot of Air. | | | Mean Weight of Cubic Foot of Air. | Number of Days for mean Direction of Wind. | | | | Number of calm, or nearly calm, Days. | Calculated from Robinson's Anemometer. | | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of days on which Rain fell. | Amount of Rain fall. | |
| | | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean degree of Humidity. | | North. | East. | South. | West. | | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | | | | On the Ground. | Feet above the Ground. |
| | | | | | | | | | | | lbs. per sq. foot | Miles | | | | Inches | Inches |
| 30·6 | ·171 | 2·0 | 0·8 | 72·8 | ... | 10·75 | 5·50 | 1·25 | 13·50 | 0·00 | ... | ... | 6·1 | 5·6 | 15 | 1·02 | ... |
| 30·9 | ·173 | 2·0 | 0·8 | 72·8 | ... | 9·50 | 5·50 | 4·00 | 9·00 | 0·00 | ... | ... | 7·1 | 5·9 | 3 | 0·16 | ... |
| 33·1 | ·189 | 2·2 | 0·8 | 73·2 | ... | 11·50 | 8·00 | 3·00 | 8·50 | 0·00 | ... | ... | 7·5 | 4·5 | 7 | 1·43 | ... |
| 42·5 | ·272 | 3·0 | 1·4 | 71·8 | ... | 8·50 | 9·00 | 3·00 | 9·50 | 0·00 | ... | ... | 4·4 | 5·0 | 6 | 0·32 | ... |
| 50·6 | ·368 | 4·1 | 1·2 | 77·0 | ... | 8·00 | 7·00 | 8·00 | 8·00 | 0·00 | ... | ... | 4·9 | 5·3 | 6 | 0·41 | ... |
| 57·5 | ·475 | 5·2 | 1·6 | 76·5 | ... | 10·50 | 4·00 | 3·00 | 12·50 | 0·00 | ... | ... | 6·0 | 5·1 | 3 | 0·43 | ... |
| 63·4 | ·586 | 6·4 | 1·2 | 84·5 | ... | 10·00 | 8·00 | 3·50 | 9·50 | 0·00 | ... | ... | 5·6 | 5·0 | 9 | 1·81 | ... |
| 58·7 | ·497 | 5·4 | 1·3 | 81·4 | ... | 13·50 | 7·00 | 1·50 | 9·00 | 0·00 | ... | ... | 5·6 | 5·2 | 4 | 0·69 | ... |
| 56·6 | ·459 | 5·1 | 0·6 | 90·4 | ... | 3·00 | 8·00 | 8·50 | 10·50 | 0·00 | ... | ... | 4·7 | 5·0 | 6 | 1·67 | ... |
| 50·0 | ·359 | 4·1 | 0·6 | 87·4 | ... | 5·50 | 5·00 | 8·50 | 12·50 | 0·00 | ... | ... | 6·0 | 4·1 | 9 | 1·47 | ... |
| 41·0 | ·257 | 2·9 | 0·4 | 88·2 | ... | 9·00 | 3·00 | 9·00 | 9·00 | 0·00 | ... | ... | 6·7 | 4·1 | 11 | 0·86 | ... |
| 33·1 | ·189 | 2·2 | 0·3 | 87·9 | ... | 13·00 | 7·50 | 6·00 | 3·50 | 1·00 | ... | ... | 8·0 | 4·4 | 10 | 1·27 | ... |
| 45·7 | ·333 | 3·7 | 0·9 | 80·3 | ... | 112·75 | 77·50 | 59·25 | 114·50 | 1·00 | ... | ... | 6·0 | 4·9 | 89 | 11·54 | ... |

Long. 1° 10′ E. Height above Sea 220 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36·2 | ·214 | 2·5 | 0·4 | 88·8 | 555·0 | 5·75 | 8·50 | 7·00 | 9·75 | 0·00 | ... | ... | 5·1 | 5·5 | 14 | 2·30 | 1·15 |
| 33·6 | ·193 | 2·2 | 0·3 | 92·6 | 556·8 | 8·50 | 9·50 | 5·00 | 5·00 | 0·00 | ... | ... | 6·1 | 5·1 | 7 | 0·39 | 0·22 |
| 33·4 | ·192 | 2·2 | 0·6 | 80·5 | 549·1 | 13·00 | 7·50 | 2·50 | 8·00 | 0·00 | ... | ... | 6·9 | 4·3 | 10 | 1·68 | 1·07 |
| 44·3 | ·292 | 3·3 | 1·1 | 74·4 | 550·0 | 13·50 | 10·00 | 3·50 | 3·00 | 0·00 | ... | ... | 3·7 | 6·2 | 6 | 0·80 | 0·60 |
| 47·4 | ·327 | 3·7 | 1·5 | 70·0 | ... | 6·00 | 7·00 | 10·50 | 7·50 | 0·00 | ... | ... | 4·7 | 5·4 | 8 | 1·48 | 1·04 |
| 52·2 | ·392 | 4·3 | 1·9 | 70·6 | 529·8 | 8·50 | 2·50 | 11·50 | 7·50 | 0·00 | ... | ... | 4·4 | 5·0 | 4 | 0·53 | 0·48 |
| 60·7 | ·532 | 5·8 | 1·3 | 82·0 | 522·7 | 5·50 | 8·50 | 9·50 | 7·50 | 0·00 | ... | ... | 5·0 | 5·3 | 10 | 0·67 | 0·58 |
| 59·8 | ·492 | 5·5 | 1·1 | 83·8 | 525·7 | 13·00 | 4·50 | 5·50 | 8·00 | 0·00 | ... | ... | 4·7 | 6·4 | 6 | 1·21 | 0·96 |
| 55·3 | ·437 | 4·9 | 0·8 | 86·2 | 532·3 | 8·00 | 6·50 | 9·00 | 6·50 | 0·00 | ... | ... | 3·8 | 5·6 | 7 | 2·70 | 2·29 |
| 50·0 | ·361 | 4·1 | 0·4 | 91·0 | 534·1 | 5·50 | 3·50 | 8·00 | 14·00 | 0·00 | ... | 580·8 | 5·5 | 6·9 | 18 | 3·52 | 2·88 |
| 40·8 | ·255 | 2·9 | 0·5 | 87·0 | 544·3 | 11·50 | 2·00 | 9·50 | 7·00 | 0·00 | ... | 474·0 | 6·6 | 3·9 | 14 | 4·30 | 3·11 |
| 33·5 | ·195 | 2·2 | 0·5 | 82·0 | 555·5 | 11·50 | 7·00 | 6.00 | 6·50 | 0·00 | ... | 482·2 | 8·0 | 4·7 | 11 | 2·35 | 1·79 |
| 45·5 | ·323 | 3·6 | 8·7 | 80·7 | ... | 110·25 | 77·00 | 87·50 | 90·25 | 0·00 | ... | ... | 5·4 | 5·3 | 111 | 21·98 | 16·15 |

Long. 0° 4′ E. Height above Sea 145 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 34·8 | ·202 | 2·3 | 0·5 | 83·2 | 550·5 | 9·75 | 3·50 | 5·50 | 12·25 | 0·00 | ... | 131·4 | 5·1 | 3·0 | 16 | 1·64 | 1·52 |
| 33·8 | ·194 | 2·2 | 0·4 | 86·2 | 550·4 | 8·00 | 6·00 | 6·25 | 7·75 | 0·00 | ... | 94·1 | 7·9 | 5·1 | 9 | 0·44 | 0·37 |
| 35·6 | ·209 | 2·4 | 0·7 | 78·7 | 548·0 | 11·50 | 6·50 | 5·50 | 7·50 | 0·00 | ... | 77·0 | 7·5 | 2·0 | 7 | 1·45 | 1·26 |
| 42·0 | ·267 | 3·0 | 1·9 | 61·9 | 536·2 | 4·00 | 6·50 | 11·25 | 7·75 | 0·50 | ... | 83·4 | 5·6 | 4·3 | 5 | 0·23 | 0·15 |
| 46·6 | ·317 | 3·6 | 2·1 | 62·7 | 528·4 | 6·75 | 5·00 | 12·00 | 7·25 | 0·00 | ... | 111·5 | 5·8 | 4·5 | 4 | 0·31 | 0·17 |
| 53·2 | ·405 | 4·5 | 2·6 | 62·8 | 524·6 | 5·75 | 3·00 | 9·25 | 11·00 | 1·00 | ... | 96·3 | 5·3 | 4·6 | 3 | 0·28 | 0·15 |
| 58·3 | ·489 | 5·3 | 2·7 | 66·6 | 519·1 | 5·75 | 5·75 | 9·25 | 10·25 | 0·00 | ... | 76·0 | 5·8 | 4·9 | 10 | 1·62 | 1·44 |
| 59·1 | ·503 | 5·5 | 1·3 | 81·0 | 522·6 | 10·00 | 8·25 | 3·50 | 8·25 | 1·00 | ... | 43·0 | 7·0 | 7·0 | 13 | 1·68 | 1·64 |
| 55·2 | ·436 | 4·9 | 1·0 | 83·2 | 529·7 | 1·75 | 10·75 | 7·25 | 8·25 | 2·00 | ... | 131·0 | 6·0 | 6·0 | 8 | 1·34 | 1·31 |
| 45·9 | ·310 | 3·5 | 1·0 | 78·3 | 532·8 | 2·50 | 3·50 | 11·00 | 13·00 | 1·00 | ... | 188·0 | 7·0 | 6·0 | 15 | 2·62 | 2·43 |
| 38·3 | ·232 | 2·7 | 0·5 | 85·0 | 544·3 | 5·50 | 5·50 | 8·75 | 6·25 | 4·00 | ... | 112·0 | 7·0 | 4·0 | 10 | 1 08 | 0·87 |
| 31·2 | ·176 | 2·1 | 0·2 | 89·0 | 556·8 | 8·75 | 5·25 | 7·50 | 7·50 | 2·00 | ... | 87·0 | 8·0 | 3·0 | 10 | 2·02 | 1·91 |
| 44 5 | ·312 | 3·5 | 1·2 | 75·7 | 539·0 | 80·00 | 69·50 | 97·00 | 107·00 | 11·50 | ... | 102·3 | 6·5 | 4·5 | 120 | 14·71 | 13·22 |

Appendix

EDINBURGH. Lat. 57° 7′ N.

| Month. | Readings of the Barometer. | | | Temperature of the Air. | | | | | | | Mean Daily Readings of | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Mean | | | | | | Hygrometer. | |
| | Mean reduced and corrected to 32°. | Highest reduced and corrected to 32°. | Lowest reduced and corrected to 32°. | Highest during Month. | Lowest during Month. | Range during Month. | Of all the highest. | Of all the lowest. | Daily Range. | Approximate Temperature. | Maximum in Sun's rays. | Minimum on Grass. | Dry Bulb. | Wet Bulb. |
| January* ... ... | 29·426 | 30·184 | 28·030 | 46·0 | 23·0 | 23·0 | 41·8 | 31·0 | 10·8 | 36·4 | 43·2 | 29·0 | 36·8 | 34·5 |
| February† ... ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| March‡ ... ... | 29·552 | 29·961 | 28·866 | 71·0 | 24·0 | 47·0 | 46·6 | 32·4 | 14·2 | 39·5 | 70·3 | 31·5 | 41·8 | 39·0 |
| April ... ... | 29·538 | 29·997 | 28·829 | 70·0 | 32·0 | 38·0 | 56·7 | 38·7 | 18·0 | 47·7 | § | 32·9 | 50·9 | 45·3 |
| May ... ... | 29·470 | 29·919 | 28·514 | 71·0 | 33·0 | 38·0 | 59·7 | 42·9 | 16·8 | 51·3 | 96·7 | 40·7 | 54·8 | 49·0 |
| June ... ... | 29·574 | 30·105 | 29·074 | 76·0 | 42·0 | 34·0 | 66·0 | 47·6 | 18·4 | 56·8 | 106·6 | 46·7 | 60·4 | 54·8 |
| July ... ... | 29·486 | 29·841 | 29·093 | 84·0 | 46·0 | 38·0 | 68·0 | 51·8 | 16·2 | 59·9 | 109·4 | 50·8 | 62·4 | 57·3 |
| August ... ... | 29·544 | 29·916 | 29·076 | 79·0 | 41·0 | 38·0 | 67·0 | 49·4 | 17·6 | 58·2 | 105·2 | 47·4 | 61·5 | 56·4 |
| September ... | 29·472 | 29·996 | 28·772 | 68·0 | 40·0 | 28·0 | 61·9 | 46·4 | 15·5 | 54·1 | 92·2 | 42·9 | 57·6 | 53·4 |
| October... ... | 29·115 | 30·094 | 28·119 | 59·0 | 33·0 | 26·0 | 52·1 | 40·0 | 12·1 | 46·0 | 69·6 | 38·0 | 48·8 | 45·8 |
| November ... | 29·257 | 30·041 | 28·558 | 51·8 | 28·4 | 23·4 | 43·8 | 33·7 | 10·1 | 38·7 | 53·1 | 31·0 | 40·8 | 38·8 |
| December ... | 29·441 | 30·153 | 28·383 | 49·5 | 14·0 | 35·5 | 38·4 | 29·4 | 9·0 | 33·9 | 39·8 | 28·3 | 35·2 | 33·7 |
| Sums, Means, and Totals ... | 29·716 | 30·173 | 28·847 | 65·9 | 32·4 | 33·5 | 54·7 | 40·3 | 14·4 | 47·5 | 71·4 | 38·1 | 50·1 | 46·2 |

Abstract of Results of Meteorological Observations

| Stations, with their Height above the Sea. | Readings of the Barometer. | | | Temperature of the Air. | | | | | | | Mean Daily Readings of | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Mean. | | | | | | Hygrometer. | |
| | Mean reduced and corrected to 32°. | Highest reduced and corrected to 32°. | Lowest reduced and corrected to 32°. | Highest during Year. | Lowest during Year. | Range during Year. | Of all the highest. | Of all the lowest. | Daily Range. | Approximate Temperature. | Maximum in Sun's rays. | Minimum on Grass. | Dry Bulb. | Wet Bulb. |
| Aldershot ... 325 ft. | 29·622 | 30·224 | 28·798 | 94·0 | 11·0 | 83·0 | 58·6 | 40·4 | 18·2 | 49·5 | 92·3 | 37·2 | 52·1 | 47·5 |
| Canterbury 80 ,, | ... | ... | ... | 90·8 | 5·0 | 85·8 | 58·9 | 37·0 | 21·9 | 47·9 | ... | ... | 53·9 | 50·9 |
| Chatham ... 160 ,, | 29·814 | 30·485 | 28·731 | 90·0 | 6·8 | 83·2 | 57·8 | 38·9 | 18·9 | 48·3 | 86·9 | ‖ | 52·0 | 49·1 |
| Colchester... 109 ,, | 29·753 | 30·491 | 28·740 | 87·2 | 9·8 | 77·4 | 59·7 | 37·9 | 21·8 | 48·8 | 87·8 | 32·6 | 52·7 | 48·2 |
| Devonport... 35 ,, | 29·756 | 30·338 | 28·837 | 84·8 | 9·8 | 75·0 | 60·7 | 39·4 | 21·3 | 50·0 | 100·9 | 31·6 | 54·5 | 50·5 |
| Dover ... 325 ,, | ... | ... | ... | 82·0 | 6·0 | 76·0 | 54·6 | 38·2 | 16·4 | 46·4 | ... | ... | 50·7 | 47·4 |
| Guernsey ... 248 ,, | 29·725 | 30·280 | 28·928 | 81·2 | 15·0 | 66·2 | ‖ | ‖ | ‖ | ‖ | ‖ | ‖ | 52·7 | 50·0 |
| Jersey ... 72·5 ,, | 29·911 | 30·491 | 28·955 | 88·2 | 17·0 | 71·2 | 61·2 | 41·8 | 19·7 | 51·3 | ... | ... | 54·3 | 51·8 |
| Netley ... 47 ,, | 29·986 | 30·588 | 28·955 | 93·0 | 14·0 | 79·0 | 59·5 | 40·0 | 19·5 | 49·7 | 85·7 | 37·0 | 52·8 | 49·0 |
| Parkhurst ... 200 ,, | ... | ... | ... | 88·0 | 11·0 | 77·0 | 58·8 | 38·3 | 20·5 | 48·5 | 86·4 | 36·7 | 53·2 | 49·8 |
| Portsmouth 20 ,, | 29·983 | 30·668 | 28·942 | 85·3 | 15·4 | 69·9 | 59·4 | 39·3 | 20·1 | 49·3 | 90·3 | 33·1 | 52·8 | 47·9 |
| Preston ... 220 ,, | ... | ... | ... | 87·0 | 5·0 | 82·0 | 65·1 | 34·9 | 30·2 | 50·0 | ... | ... | 49·9 | 48·0 |
| Sheerness 2 ft. below | ... | ... | ... | 87·2 | 10·0 | 77·2 | 57·1 | 38·3 | 18·8 | 47·7 | ... | .. | 51·7 | 48·8 |
| Shorncliffe... 220 ft. | 29·818 | 30·481 | 28·046 | 85·4 | 14·4 | 71·0 | ‖ | ‖ | ‖ | ‖ | 94·8 | ‖ | 50·1 | 48·1 |
| Woolwich ... 145 ,, | 29·682 | 30·358 | 28·674 | 87·8 | 8·9 | 78·9 | ‖ | ‖ | ‖ | ‖ | 87·5 | 39·3 | 52·1 | 48·2 |
| Edinburgh¶ 402 ,, | 29·532 | 30·184 | 28·030 | 84·0 | 14·0 | 70·0 | 54·7 | 40·3 | 14·4 | 47·5 | 71·4 | 38·1 | 50·1 | 46·2 |

* January: for 27 days only.
† February: observations extended over only 4 days, and are therefore omitted,
‡ March: for 23 days only.
§ April: maximums omitted as the observations were not taken during the last 8 days of the month.
‖ Useless.
¶ Edinburgh: The observations for February extend over 4 days only. They are therefore omitted.

**No. XXII—*continued.***

Long. 3° 11′ W. Height above Sea 402 feet.

| Hygrometrical Results from Glaisher's Tables (3rd edition). | | | | | | Atmospherical Conditions. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | In a Cubic Foot of Air. | | | Mean Weight of Cubic Foot of Air. | Number of Days for mean Direction of Wind. | | | | Number of calm, or nearly calm, Days. | Calculated from Robinson's Anemometer. | | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of days on which Rain fell. | Amount of Rain fall. | |
| | | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean degree of Humidity. | | North. | East. | South. | West. | | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | | | | On the Ground. | 20 Feet above the Ground. |
| | | | | | | | | | | | lbs. per sq. foot | Miles | | | | Inches | Inches |
| 31·2 | ·176 | 2·0 | 0·6 | 80·9 | 549·3 | 5·75 | 0·75 | 3·75 | 16·25 | 0·50 | ... | 144·1 | 6·0 | 1·3 | 5 | 0·97 | 0·86 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 35·5 | ·209 | 2·4 | 0·7 | 79·2 | 546·0 | 4·75 | 2·25 | 3·75 | 10·75 | 1·50 | ... | 175·4 | 5·9 | 2·2 | 5 | 0·68 | 0·58 |
| 39·5 | ·243 | 2·8 | 1·4 | 65·3 | 535·9 | 10·00 | 2·25 | 3·00 | 13·75 | 1·00 | ... | 226·4 | 5·7 | 3·5 | 3 | 0·21 | 0·18 |
| 43·4 | ·282 | 3·2 | 1·6 | 65·0 | 530·3 | 7·00 | 2·00 | 3·25 | 16·25 | 2·50 | ... | 187·1 | 6·0 | 3·0 | 5 | 0·29 | 0·27 |
| 49·9 | ·360 | 4·0 | 1·9 | 68·4 | 525·9 | 8·50 | 2·00 | 1·25 | 15·75 | 2·50 | ... | 195·4 | 6·5 | 2·5 | 11 | 1·23 | 1·11 |
| 52·9 | ·403 | 4·4 | 1·8 | 71·5 | 522·0 | 4·50 | 8·00 | 3·00 | 13·00 | 2·50 | ... | 178·2 | 6·0 | 2·0 | 8 | 0·92 | 0·91 |
| 52·0 | ·388 | 4·3 | 1·8 | 71·5 | 524·1 | 5·75 | 9·75 | 0·00 | 11·50 | 4·00 | ... | 164·9 | 5·5 | 3·2 | 10 | 0·15 | 0·13 |
| 49·6 | ·355 | 4·0 | 1·4 | 74·4 | 527·1 | 3·50 | 1·50 | 0·00 | 18·50 | 6·00 | ... | 185·5 | 4·5 | 1.0 | 9 | 0·02 | 0·99 |
| 42·6 | ·274 | 3·2 | 0·8 | 79·8 | 531·8 | 2·00 | 7·75 | 0·00 | 17·25 | 4·00 | ... | 240·6 | 6·0 | 2·0 | 12 | 1·64 | 1·29 |
| 36·3 | ·214 | 2·5 | 0·5 | 84·8 | 541·5 | 5·50 | 4·25 | 0·50 | 15·75 | 4·00 | ... | 153·1 | 6·3 | 0·6 | 12 | 0·95 | 0·67 |
| 31·4 | ·176 | 2·1 | 0·3 | 85·4 | 551·5 | 12·50 | 5·75 | 0·75 | 7·50 | 4·50 | ... | 247·0 | 5·9 | 1·0 | 11 | 1·67 | 1·18 |
| 42·2 | ·280 | 3·2 | 1·2 | 75·1 | 533·2 | 69·75 | 46·25 | 19·25 | 156·25 | 33·50 | ... | 190·7 | 6·0 | 2·0 | 91 | 9·73 | 8·18 |
| | | | | | | 325 days only. | | | | | | | | | | | |

taken at Stations in England and Scotland in the year 1870.

| Hygrometrical Results from Glaisher's Tables (3rd edition). | | | | | | Atmospherical Conditions. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | In a Cubic Foot of Air. | | | Mean Weight of Cubic Foot of Air. | Number of Days for mean Direction of Wind. | | | | Number of calm, or nearly calm, Days. | Calculated from Robinson's Anemometer. | | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of Days on which Rain fell. | Rain fall on the Ground. | Latitude. | Longitude. |
| | | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean Degree of Humidity. | | North. | East. | South. | West. | | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | | | | | | |
| | | | | | | | | | | | lbs. per sq. foot | Miles | | | | Inches | ° ′ | ° ′ |
| 43·1 | ·396 | 3·3 | 1·5 | 73·4 | 534·2 | 93·50 | 73·00 | 77·00 | 121·50 | 0·00 | ... | 230·6 | 7·2 | 2·9 | 140 | 23·43 | 51 15 N. | 0 45 W |
| 48·9 | ·370 | 4·2 | 1·0 | 86·7 | ... | 62·75 | 97·50 | 98·50 | 97·25 | 9·00 | ... | ... | 2·8 | 3·1 | 107 | 16·64 | 51 17 ,, | 1 5 E. |
| 46·4 | ·336 | 3·7 | 0·9 | 84·2 | 539·3 | 75·50 | 80·75 | 93·25 | 103·00 | 12·50 | ... | 224·6 | 6·4 | 2·8 | 136 | 19·43 | 51 23 ,, | 0 32 W. |
| 44·1 | ·283 | 3·7 | 2·4 | 74·1 | 538·9 | 93·25 | 77·75 | 81·00 | 113·00 | 0·00 | ... | 190·9 | 7·1 | 3·8 | 111 | 17·13 | 51 53 ,, | 0 54 ,, |
| 46·1 | ·325 | 3·6 | 1·4 | 74·1 | 535·7 | 61·25 | 103·75 | 79·50 | 113·00 | 6·50 | ... | 216·4 | 6·7 | 4·2 | 130 | 27·56 | 50 17 ,, | 4 5 ,, |
| 44·0 | ·308 | 3·5 | 1·0 | 78·1 | ... | 65·50 | 108·75 | 74·75 | 115·50 | 0·50 | ... | ... | 5·7 | 4·6 | 134 | 20·97 | 51 8 ,, | 1 19 E. |
| 47·4 | ·341 | 3·8 | 0·8 | 82·5 | 537·3 | 107·50 | 74·50 | 69·50 | 112·50 | 1·00 | ... | ... | 5·0 | 5·3 | 114 | 22·00 | 49 33 ,, | 2 40 W. |
| 47·8 | ·339 | 3·9 | 1·1 | 79·7 | 537·0 | 84·50 | 100·50 | 66·50 | 109·00 | 4·50 | ... | ... | 4·6 | 6·3 | 133 | 23·68 | 49 11 ,, | 2 6 ,, |
| 45·4 | ·318 | 3·5 | 1·3 | 77·1 | 540·8 | 97·50 | 58·25 | 89·50 | 114·25 | 5·50 | ... | 227·3 | 6·6 | 3·2 | 93 | 14·01 | 50 51 ,, | 1 20 ,, |
| 46·6 | ·328 | 3·8 | 1·1 | 79·2 | ... | 77·25 | 102·50 | 76·50 | 108·25 | 0·50 | ... | ... | 6·0 | 5·3 | 98 | 26·92 | 50 43 ,, | 1 16 ,, |
| 43·2 | ·292 | 3·3 | 1·5 | 70·7 | 540·8 | 75·00 | 66·75 | 62·25 | 97·50 | 63·50 | ... | 151·6 | 5·9 | 3·0 | 104 | 19·75 | 50 45 ,, | 1 5 ,, |
| 46·1 | ·343 | 3·8 | 0·6 | 77·4 | ... | 74·50 | 167·00 | 2·50 | 67·50 | 53·50 | ... | ... | 2·7 | 1·6 | 150 | 33·65 | 53 45 ,, | 2 40 ,, |
| 45·7 | ·333 | 3·7 | 0·9 | 80·3 | ... | 112·75 | 77·50 | 59·25 | 114·50 | 1·00 | ... | ... | 6·0 | 4·9 | 89 | 11·54 | 51 23 ,, | 0 49 E. |
| 45·5 | ·322 | 3·6 | 8·7 | 80·7 | ... | 110·25 | 77·00 | 87·50 | 90·25 | 0·00 | ... | ... | 5·4 | 5·3 | 111 | 21·98 | 51 5 ,, | 1 10 ,, |
| 44·5 | ·312 | 3·5 | 1·2 | 75·7 | 537·1 | 80·00 | 69·50 | 97·00 | 107·00 | 11·50 | ... | 102·3 | 6·5 | 4·5 | 120 | 14·71 | 51 29 ,, | 0 4 ,, |
| 42·2 | ·280 | 3·2 | 1·2 | 75·1 | 533·2 | 69·75 | 46·25 | 19·25 | 156·25 | 33·50 | ... | 190·7 | 5·0 | 2·0 | 91 | 9·73 | 55 7 ,, | 3 11 W |

Appendix

## Abstract of Results of Meteorological Observations

### BELFAST. Lat. 54° 36′ N.

| Month. | Readings of the Barometer. | | | Temperature of the Air. | | | | | | | Mean Daily Readings of | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean reduced and corrected to 32°. | Highest reduced and corrected to 32°. | Lowest reduced and corrected to 32°. | Highest during Month. | Lowest during Month. | Range during Month. | Mean | | | | Maximum in Sun's rays. | Minimum on Grass. | Hygrometer. | |
| | | | | | | | Of all the highest. | Of all the lowest. | Daily Range. | Approximate Temperature. | | | Dry Bulb. | Wet Bulb. |
| January ... ... | 29·802 | 30·556 | 28·554 | 55·5 | 22·0 | 33·5 | 51·1 | 31·1 | 20·0 | 41·1 | 52·5 | ... | 40·1 | 38·4 |
| February ... ... | 29·754 | 30·433 | 29·026 | 53·2 | 25·6 | 27·6 | 49·1 | 32·1 | 17·0 | 40·6 | 59·8 | ... | 39·8 | 37·6 |
| March ... ... ... | 30·008 | 30·497 | 29·219 | 63·7 | 24·0 | 39·7 | 57·5 | 35·4 | 22·1 | 46·4 | 81·1 | ... | 45·7 | 41·9 |
| April ... ... ... | 29·969 | 30·423 | 29·290 | 70·2 | 29·0 | 41·2 | 61·9 | 37·9 | 24·0 | 49·9 | 91·2 | ... | 52·0 | 47·5 |
| May ... ... ... | 29·860 | 30·410 | 28·729 | 72·8 | 35·5 | 37·3 | 63·4 | 43·8 | 19·6 | 53·6 | 96·1 | ... | 55·8 | 51·2 |
| June ... ... ... | 30·013 | 30·515 | 29·563 | 82·4* | 43·0* | 39·4* | 74·0* | 51·3* | 22·7* | 62·6* | 109·9* | ... | 62·2 | 56·3 |
| July ... ... ... | 29·907 | 30·226 | 29·561 | 83·5 | 46·0 | 37·5 | 73·0 | 51·8 | 21·2 | 62·4 | 102·3 | ... | 65·5 | 59·2 |
| August ... ... | 29·958 | 30·312 | 29·601 | 82·0 | 39·9 | 42·1 | 72·4 | 49·2 | 23·2 | 60·8 | 82·3 | ... | 66·1 | 61·4 |
| September ... ... | 29·901 | 30·414 | 28·931 | 73·0 | 38·9 | 34·1 | 62·2 | 46·9 | 15·3 | 54·5 | 70·9 | ... | 60·1 | 59·2 |
| October ... ... | 29·577 | 30·503 | 28·419 | 65·7 | 33·8 | 31·9 | 56·8 | 41·6 | 15·2 | 49·2 | 63·9 | ... | 51·3 | 50·3 |
| November ... ... | 29·696 | 30·487 | 28·884 | 56·4 | 26·2 | 30·2 | 48·3 | 33·8 | 14·5 | 41·0 | 61·0 | ... | 43·0 | 41·4 |
| December ... ... | 29·871 | 30·540 | 28·686 | 52·1 | 8·0 | 44·1 | 42·2 | 28·5 | 13·7 | 35·3 | broken | ... | 36·5 | 35·1 |
| Yearly Sums, Means, and Totals ... | 29·845 | 30·443 | 29·047 | 67·5 | 31·0 | 36·5 | 59·3 | 40·3 | 19·0 | 49·8 | ... | ... | 51·5 | 48·3 |

### BUTTEVANT. Lat. 52° 14′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | ... | ... | ... | 55·0 | 16·8 | 38·2 | 46·3 | 32·0 | 14·3 | 39·1 | ... | ... | 40·9 | 39·4 |
| February ... ... | ... | ... | ... | 51·8 | 13·5 | 38·3 | 45·9 | 29·3 | 16·6 | 37·6 | ... | ... | 40·3 | 38·3 |
| March ... ... ... | ... | ... | ... | 61·2 | 23·0 | 38·2 | 51·2 | 34·4 | 16·8 | 42·8 | ... | ... | 45·6 | 42·8 |
| April ... ... ... | ... | ... | ... | 67·9 | 28·4 | 39·5 | 59·2 | 36·8 | 22·4 | 48·0 | ... | ... | 53·2 | 48·4 |
| May ... ... ... | ... | ... | ... | 72·2 | 34·2 | 38·0 | 61·5 | 42·9 | 18·6 | 52·2 | ... | ... | 55·9 | 51·5 |
| June ... ... ... | ... | ... | ... | 81·0 | 35·5 | 45·5 | 69·1 | 47·7 | 21·4 | 58·4 | ... | ... | 62·9 | [illegible] |
| July ... ... ... | ... | ... | ... | 84·9 | 38·1 | 46·8 | 73·9 | 49·4 | 24·5 | 61·6 | ... | ... | 67·0 | 60·4 |
| August ... ... ... | ... | ... | ... | 83·2 | 31·0 | 57·2 | 74·8 | 45·1 | 29·7 | 59·9 | ... | ... | 67·1 | 59·4 |
| September ... ... | ... | ... | ... | 73·0 | 31·2 | 41·8 | 67·1 | 45·8 | 21·3 | 56·4 | ... | ... | 60·9 | 56·8 |
| October ... ... | ... | ... | ... | 68·1 | 26·5 | 41·6 | 59·4 | 40·5 | 18·9 | 49·9 | ... | ... | 52·9 | 50·0 |
| November ... ... | ... | ... | ... | 60·0 | 22·0 | 38·0 | 50·3 | 32·2 | 18·1 | 41·2 | ... | ... | 43·6 | 42·0 |
| December ... ... | ... | ... | ... | 54·0 | 14·0 | 40·0 | 43·4 | 24·6 | 18·8 | 34·0 | ... | ... | 36·3 | 35·1 |
| Yearly Sums, Means, and Totals ... | ... | ... | ... | 68·1 | 26·2 | 41·9 | 58·5 | 38·4 | 20·1 | 48·4 | ... | ... | 52·2 | 48·5 |

### CORK. Lat. 51° 53′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | 29·598 | 30·160 | 28·848 | 54·0 | 26·0 | 28·0 | 50·4 | 31·5 | 18·9 | 40·9 | 63·1 | 25·1 | 44·9 | 40·8 |
| February ... ... | 29·467 | 30·000 | 28·778 | 52·0 | 22·0 | 30·0 | 47·6 | 29·6 | 18·0 | 38·6 | 61·5 | 22·4 | 42·6 | 37·5 |
| March ... ... | 29·699 | 30·148 | 28·972 | 55·0 | 28·0 | 27·0 | 51·7 | 30·5 | 21·2 | 41·0 | 68·1 | 22·6 | 47·3 | 42·7 |
| April ... ... ... | 29·878 | 30·157 | 29·015 | 69·0 | 30·0 | 39·0 | 59·1 | 36·7 | 22·4 | 47·9 | 80·1 | 28·6 | 53·4 | 49·2 |
| May ... ... ... | 29·702 | 30·172 | 28·770 | 66·0 | 31·0 | 35·0 | 60·2 | 39·2 | 21·0 | 49·7 | 74·3 | 33·1 | 55·4 | 50·9 |
| June ... ... ... | 29·882 | 30·138 | 29·450 | 72·0 | 38·0 | 34·0 | 68·1 | 41·3 | 26·8 | 54·7 | 76·0 | 35·4 | 62·9 | 58·2 |
| July ... ... ... | 29·819 | 30·045 | 29·534 | 82·0 | 39·0 | 43·0 | 74·5 | 47·7 | 26·8 | 61·1 | 86·1 | 40·3 | 68·3 | 63·3 |
| August ... ... | 29·779 | 30·009 | 29·382 | 85·0 | 68·0 | 17·0 | 74·9 | 47·8 | 27·1 | 61·3 | 96·0 | 41·2 | 68·7 | 63·2 |
| September ... ... | 29·743 | 30·136 | 28·996 | 72·0 | 38·0 | 34·0 | 67·0 | 46·6 | 20·4 | 56·8 | 87·1 | 39·4 | 62·1 | 58·1 |
| October... ... | 29·323 | 29·838 | 28·613 | 68·0 | 38·0 | 30·0 | 60·3 | 41·1 | 19·2 | 50·7 | 77·6 | 33·9 | 55·5 | 52·3 |
| November ... ... | 29·526 | 30·207 | 28·730 | 60·0 | 28·0 | 32·0 | 51·9 | 35·5 | 16·4 | 43·7 | 69·1 | 26·7 | 46·0 | 42·5 |
| December ... ... | 29·610 | 30·204 | 28·576 | 54·0 | 18·0 | 36·0 | 46·5 | 29·2 | 17·3 | 37·8 | 62·0 | 23·4 | 41·1 | 37·5 |
| Yearly Sums, Means, and Totals ... | 29·660 | 30·101 | 28·972 | 65·7 | 33·7 | 32·0 | 59·3 | 38·1 | 21·2 | 48·7 | 75·1 | 31·0 | 53·9 | 49·7 |

* For 28 days only.

No. XXII—*continued.*

taken at Stations in Ireland in the year 1870.

Long. 5° 57′ W. Height above Sea 45 feet.

| Hygrometrical Results from Glaisher's Tables (3rd edition). | | | | | | Atmospherical Conditions. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | In a Cubic Foot of Air. | | | | Number of Days for mean Direction of Wind. | | | | | Calculated from Robinson's Anemometer. | | | | | Amount of Rain fall. | |
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean Degree of Humidity. | Mean Weight of Cubic Foot of Air. | North. | East. | South. | West. | Number of calm, or nearly calm, Days. | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of Days on which Rain fell. | On the Ground. | 30 Feet above the Ground. |
| | | | | | | | | | | | lbs. per sq. foot. | Miles. | | | | Inches. | Inches. |
| 36·2 | ·213 | 2·5 | 0·6 | 86·5 | 552·4 | 4·50 | 2·00 | 8·00 | 14·50 | 2·00 | ... | 105·6 | 7·0 | 0·6 | 17 | 3·11 | 3·05 |
| 34·7 | ·202 | 2·3 | 0·5 | 82·4 | 551·7 | 4·50 | 9·50 | 6·50 | 5·50 | 2·00 | ... | 150·4 | 6·5 | 1·4 | 15 | 2·81 | 2·74 |
| 37·5 | ·226 | 2·6 | 0·9 | 73·9 | 549·9 | 9·50 | 9·50 | 3·50 | 8·50 | 0·00 | ... | 133·0 | 6·2 | 1·4 | 10 | 1·43 | 1·00 |
| 42·9 | ·276 | 3·1 | 1·2 | 71·5 | 542·6 | 7·50 | 3·50 | 4·50 | 13·50 | 1·00 | ... | 192·2 | 6·5 | 2·1 | 15 | 1·79 | 1·73 |
| 46·9 | ·323 | 3·7 | 1·3 | 72·2 | 537·0 | 6·00 | 5·50 | 8·00 | 10·50 | 1·00 | ... | 167·3 | 6·8 | 2·6 | 16 | 2·72 | 2·65 |
| 51·2 | ·378 | 4·2 | 2·1 | 67·7 | 531·8 | 5·00 | 2·00 | 4·50 | 16·50 | 1·00 | ... | 102·8 | 6·5 | 2·7 | 13 | 1·26 | 1·24 |
| 54·1 | ·417 | 4·6 | 2·3 | 67·0 | 526·2 | 3·50 | 3·00 | 7·50 | 9·00 | 8·00 | ... | 100·0 | 3·2 | 1·1 | 11 | 1·97 | 1·84 |
| 57·7 | ·476 | 5·2 | 1·8 | 74·6 | 526·3 | 8·50 | 7·00 | 5·50 | 5·00 | 5·00 | .. | 50·8 | 3·3 | 1·9 | 11 | * | 2·33 |
| 58·4 | ·490 | 5·5 | 0·4 | 94·6 | 531·2 | 2·50 | 2·00 | 8·00 | 7·50 | 10·00 | ... | 49·1 | 3·3 | 0·6 | 18 | 2·78 | 2·70 |
| 49·3 | ·352 | 4·0 | 0.3 | 93·0 | 535·1 | 4·50 | 5·00 | 11·50 | 10·00 | 0·00 | ... | 81·0 | 3·1 | 3·0 | 22 | 10·73 | 10·43 |
| 39·5 | ·242 | 2·8 | 0·4 | 87·2 | 547·2 | 8·00 | 2·50 | 6·50 | 10·00 | 3·00 | ... | 43·9 | 2·9 | 3·0 | 10 | 0·50 | 0·90 |
| 33·1 | ·189 | 2·2 | 0·4 | 87·9 | 558·0 | 7·50 | 9·00 | 4·50 | 5·00 | 5·00 | ... | 77·3 | 1·9 | 0·3 | 12 | 2·77 | 2·60 |
| 45·1 | ·315 | 3·5 | 1·0 | 79·8 | 541·8 | 71·50 | 60·50 | 78·50 | 115·50 | 38·00 | ... | 104·4 | 4·7 | 1·7 | 170 | ... | 33·21 |

Lon. 8° 40′ W. Height above Sea feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 37·5 | ·224 | 2·6 | 0·4 | 88·0 | ... | 7·25 | 8·25 | 9·50 | 3·00 | 3·00 | ... | ... | 7·8 | 4·6 | 16 | 4·41 | ... |
| 35·7 | ·210 | 2·4 | 0·5 | 84·3 | ... | 8·50 | 9·25 | 5·00 | 3·25 | 2·00 | ... | ... | 7·3 | 4·2 | 15 | 2·85 | ... |
| 39·6 | ·244 | 2·8 | 0·7 | 80·0 | ... | 6·75 | 9·50 | 3·75 | 3·00 | 8·00 | ... | ... | 8·0 | 3·8 | 15 | 2·55 | ... |
| 43·6 | ·284 | 3·2 | 1·2 | 70·0 | ... | 3·50 | 4·75 | 12·25 | 6·00 | 3·50 | ... | ... | 6·1 | 3·3 | 11 | 1·41 | ... |
| 47·3 | ·330 | 3·7 | 1·3 | 73·5 | ... | 2·75 | 3·75 | 13·25 | 7·75 | 3·50 | ... | ... | 7·2 | 3·2 | 16 | 3·48 | ... |
| 53·1 | ·405 | 4·5 | 1·9 | 70·5 | ... | 2·75 | 0·50 | 10·50 | 12·25 | 4·00 | ... | ... | 7·6 | 3·2 | 10 | 0·47 | ... |
| 55·1 | ·436 | 4·8 | 2·5 | 65·6 | ... | 1·75 | 0·75 | 12·25 | 11·25 | 5·00 | ... | ... | 6·2 | 2·8 | 6 | 0·85 | ... |
| 53·2 | ·407 | 4·5 | 2·8 | 61·2 | ... | 2·50 | 1·75 | 9·25 | 8·50 | 9·00 | ... | ... | 5·1 | 3·0 | 12 | 1·54 | ... |
| 53·3 | ·407 | 4·5 | 1·4 | 76·3 | ... | 1·00 | 4·50 | 11·25 | 5·75 | 7·50 | ... | ... | 6·8 | 3·6 | 15 | 3·52 | ... |
| 47·1 | ·324 | 3·6 | 0·9 | 80·6 | ... | 2·00 | 5·50 | 10·00 | 9·50 | 3·00 | ... | ... | 5·9 | 5·9 | 26 | 4·96 | ... |
| 40·1 | ·245 | 2·8 | 0·4 | 87·2 | ... | 7·00 | 7·75 | 10·00 | 5·25 | 0·00 | ... | ... | 6·5 | 4·8 | 15 | 2·11 | ... |
| 33·4 | ·192 | 2·2 | 0·3 | 89·5 | ... | 11·25 | 9·00 | 6·25 | 4·50 | 0·00 | ... | ... | 5·4 | 5·7 | 10 | 3·2 | ... |
| 44·9 | ·309 | 3·5 | 1·4 | 77·2 | ... | 57·00 | 65·25 | 113·25 | 80·00 | 48·50 | ... | ... | 6·7 | 4·0 | 167 | 31·35 | ... |

Long. 8° 20′ W. Height above Sea 257 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36·1 | ·213 | 2·5 | 0·9 | 71·3 | 543·4 | 9·25 | 3·25 | 9·75 | 8·75 | 0·00 | ... | 121·2 | 9·0 | 5 5 | 16 | 5·40 | 4·72 |
| 31·3 | ·177 | 2·0 | 1·1 | 65·4 | 543·6 | 9·25 | 6·00 | 6·00 | 6·75 | 0·00 | ... | 135·7 | 8·0 | 5·0 | 8 | 2·57 | 2·04 |
| 37·6 | ·225 | 2·6 | 1·1 | 69·7 | 542·6 | 7·00 | 4·75 | 5·00 | 14·25 | 0·00 | ... | 143·5 | 7·0 | 4·0 | 10 | 3·42 | 2·99 |
| 45·0 | ·299 | 3·4 | 1·2 | 73·2 | 538·8 | 6·00 | 2·75 | 9·25 | 12·00 | 0·00 | ... | 153·4 | 6·0 | 4·0 | 9 | 2·19 | 1·85 |
| 46·7 | ·320 | 3·6 | 1·3 | 72·5 | 533·5 | 4·25 | 4·50 | 13·00 | 9·25 | 0·00 | ... | 151·2 | 8·0 | 4·5 | 18 | 5·32 | 4·67 |
| 55·0 | ·433 | 4·8 | 1·4 | 78·0 | 529·3 | 9·75 | 0·00 | 5·00 | 15·25 | 0·00 | ... | 144·4 | 6·0 | 4·0 | 4 | 0·96 | 0·79 |
| 59·4 | ·506 | 5·6 | 2·0 | 73·0 | 521·4 | 5·25 | 4·75 | 11·25 | 9·75 | 0·00 | ... | 144·5 | 5·0 | 4·0 | 1 | 0·06 | 0·00 |
| 58·9 | ·497 | 5·5 | 2·2 | 70·5 | 520·5 | 9·25 | 2·00 | 9·50 | 10·25 | 0·00 | ... | 146·0 | 5·0 | 4·0 | 6 | 1·77 | 1·45 |
| 54·7 | ·429 | 4·7 | 1·5 | 77·0 | 526·7 | 3·50 | 1·00 | 12·25 | 13·25 | 0·00 | ... | 149·1 | 7·0 | 4·0 | 13 | 4·37 | 3·88 |
| 49·2 | ·353 | 3·9 | 1·0 | 80·3 | 526·5 | 7·50 | 1·75 | 4·50 | 17·25 | 0·00 | ... | 169·5 | 8·3 | 5·1 | 20 | 7·68 | 6·73 |
| 38·5 | ·234 | 2·7 | 0·9 | 76·0 | 540·9 | 11·00 | 2·25 | 8·00 | 8·75 | 0·00 | ... | ... | 7·0. | 4·9 | 15 | 4·53 | 3·81 |
| 33·0 | ·188 | 2·2 | 0·8 | 73·0 | 548·0 | 12·50 | 1·75 | 3·75 | 13·00 | 0·00 | ... | ... | 6·8 | 4·7 | 11 | 4·75 | 4·20 |
| 45·4 | ·323 | 3·6 | 1·3 | 73·3 | 535·1 | 94·50 | 34·75 | 97·25 | 138·50 | 0·00 | ... | 145·8 | 6·9 | 4·6 | 131 | 43·02 | 37·13 |

* Out of order.

Appendix

## CURRAGH CAMP. Lat. 52° 8′ N.

| Month. | Readings of the Barometer. | | | Temperature of the Air. | | | | | | | Mean Daily Readings of | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean reduced and corrected to 32°. | Highest reduced and corrected to 32°. | Lowest reduced and corrected to 32°. | Highest during Month. | Lowest during Month. | Range during Month. | Mean | | | | Maximum in Sun's rays. | Minimum on Grass. | Hygrometer. | |
| | | | | | | | Of all the highest. | Of all the lowest. | Daily Range. | Approximate Temperature. | | | Dry Bulb. | Wet Bulb. |
| January ... ... | 29·393 | 30·052 | 28·320 | 53·6 | 22·0 | 31·6 | 45·5 | 31·7 | 13·8 | 38·6 | 55·6 | ... | 39·2 | 37·1 |
| February ... ... | 29·300 | 30·026 | 28·624 | 54·4 | 22·4 | 32·0 | 43·9 | 30·1 | 13·8 | 37·0 | 62·6 | ... | 38·8 | 36·6 |
| March ... ... ... | 29·583 | 29·990 | 28·830 | 60·9 | 24·3 | 36·6 | 49·0 | 33·0 | 16·0 | 41·0 | 76·0 | ... | 43·7 | 41·3 |
| April ... ... ... | 29·615 | 30·026 | 28·808 | 70·6 | 30·7 | 39·9 | 58·7 | 37·6 | 21·1 | 48·1 | 90·8 | ... | 51·5 | 47·9 |
| May ... ... ... | 29·480 | 29·982 | 28·393 | 78·7 | 30·9 | 47·8 | 61·1 | 42·0 | 19·1 | 51·5 | 91·8 | ... | 54·8 | 51·9 |
| June ... ... ... | 29·650 | 30·089 | 29·187 | 82·3 | 39·5 | 42·8 | 68·0 | 46·9 | 21·1 | 57·4 | 99·3 | ... | 60·5 | 57·8 |
| July ... ... ... | 29·511 | 29·780 | 29·255 | 83·4 | 40·4 | 43·0 | 72·6 | 49·1 | 23·5 | 60·9 | 103·3 | ... | 65·5 | 62·3 |
| August ... ... ... | 29·539 | 29·843 | 29·075 | 86·1 | 37·4 | 48·7 | 73·2 | 46·7 | 26·5 | 59·9 | 105·2 | ... | 64·9 | 60·2 |
| September ... ... | 29·522 | 29·991 | 28·706 | 79·3 | 39·3 | 40·0 | 67·6 | 48·2 | 19·4 | 57·9 | 95·0 | 41·2 | 59·6 | 55·9 |
| October .. ... ... | 29·175 | 30·019 | 28·227 | 71·2 | 29·6 | 41·6 | 58·8 | 39·7 | 19·1 | 48·2 | 80·2 | 32·4 | 50·8 | 48·1 |
| November ... ... | 29·277 | 30·054 | 28·418 | 58·4 | 22·2 | 36·2 | 48·9 | 32·8 | 16·1 | 40·8 | 66·3 | 25·0 | 42·0 | 39·7 |
| December ... ... | 29·426 | 30·110 | 28·236 | 59·2 | 10·5 | 48·7 | 41·8 | 25·0 | 16·8 | 33·4 | 49·1 | 13·5 | 35·0 | 33·1 |
| Yearly Sums, Means, and Totals ... | 29·473 | 29·997 | 28·673 | 69·8 | 29·1 | 40·7 | 57·4 | 38·6 | 18·8 | 48·0 | 81·3 | ... | 50·5 | 47·7 |

## DUBLIN. Lat 53° 25′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | 29·758 | 30·428 | 28·561 | 58·0 | 28·3 | 34·7 | 46·1 | 34·1 | 12·0 | 40·1 | 64·0 | 30·6 | 41·3 | 39·1 |
| February ... ... | 29·678 | 30·417 | 29·030 | 55·9 | 26·1 | 29·8 | 45·3 | 33·1 | 12·2 | 39·2 | 69·8 | 29·8 | 41·0 | 38·5 |
| March ... ... ... | 29·958 | 30·410 | 29·261 | 61·4 | 21·9 | 39·5 | 49·7 | 35·0 | 14·7 | 42·3 | 87·9 | 32·5 | 45·0 | 42·0 |
| April ... ... ... | 29·977 | 30·398 | 29·187 | 67·0 | 27·3 | 39·2 | 58·7 | 38·7 | 20·0 | 48·7 | 107·9 | 36·6 | 52·9 | 48·9 |
| May ... ... ... | 29·837 | 30·376 | 28·806 | 75·5 | 33·0 | 42·5 | 61·9 | 43·6 | 18·3 | 52·7 | 108·4 | 42·3 | 56·5 | 52·4 |
| June ... ... ... | 29·926 | 30·423 | 29·561 | 78·5 | 37·0 | 41·5 | 69·6 | 49·6 | 20·0 | 59·6 | 118·1 | 46·3 | 62·6 | 57·7 |
| July ... ... ... | 29·863 | 30·155 | 29·595 | 84·8 | 44·0 | 40·8 | 72·2 | 52·8 | 19·4 | 62·5 | 120·6 | 48·4 | 65·6 | 60·7 |
| August ... ... ... | 29·897 | 30·209 | 29·443 | 86·2 | 38·6 | 47·6 | 71·4 | 48·4 | 23·0 | 59·9 | 120·7 | 45·0 | 65·1 | 60·7 |
| September ... ... | 29·864 | 30·299 | 28·999 | 75·2 | 33·0 | 42·2 | 67·3 | 47·4 | 19·9 | 57·3 | 110·1 | 44·5 | 60·8 | 56·3 |
| October ... ... | 29·529 | 30·390 | 28·530 | 67·9 | 28·6 | 39·3 | 59·9 | 41·0 | 18·9 | 50·4 | 95·9 | 36·1 | 52·2 | 49·2 |
| November ... ... | 29·642 | 30·413 | 28·847 | 57·2 | 26·0 | 31·2 | 48·4 | 33·6 | 14·8 | 41·0 | 74·6 | 28·2 | 43·0 | 40·8 |
| December ... ... | 29·800 | 30·467 | 28·551 | 53·0 | 13·8 | 39·2 | 41·6 | 28·1 | 13·5 | 34·8 | 59·8 | 23·7 | 36·9 | 35·2 |
| Yearly Sums, Means, and Totals ... | 29·311 | 30·366 | 29·031 | 68·4 | 29·4 | 39·0 | 57·7 | 40·5 | 17·2 | 49·1 | 94·8 | 37·0 | 51·9 | 49·1 |

## FERMOY. Lat. 52° 2′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | ... | ... | ... | 59·5 | 24·0 | 35·5 | 57·5 | 36·2 | 21·3 | 46·8 | ... | ... | 43·2 | 40·3 |
| February ... ... | ... | ... | ... | 57·5 | 23·0 | 34·5 | 50·5 | 34·4 | 16·1 | 42·4 | ... | ... | 41·0 | 38·5 |
| March ... ... ... | ... | ... | ... | 59·5 | 30·0 | 29·5 | 53·9 | 34·1 | 19·8 | 44·0 | ... | ... | 45·6 | 43·0 |
| April ... ... ... | ... | ... | ... | 61·8 | 42·1 | 19·7 | 59·2 | 44·6 | 14·6 | 51·9 | ... | ... | 50·9 | 48·6 |
| May ... ... ... | ... | ... | ... | 63·4 | 41·4 | 22·0 | 60·4 | 44·5 | 15·9 | 52·4 | ... | ... | 48·6 | 47·1 |
| June ... ... ... | ... | ... | ... | 78·3 | 61·4 | 16·9 | 70·9 | 50·5 | 20·4 | 60·7 | ... | ... | 59·2 | 56·2 |
| July ... ... ... | ... | ... | ... | 84·6 | 52·4 | 32·2 | 70·6 | 55·6 | 15·0 | 63·1 | ... | ... | 62·8 | 59·8 |
| August ... ... ... | ... | ... | ... | 76·8 | 48·2 | 28·6 | 74·2 | 52·3 | 21·9 | 63·2 | ... | ... | 62·6 | 59·5 |
| September ... ... | ... | ... | ... | 76·9 | 49·1 | 27·8 | 74·3 | 51·4 | 22.9 | 62·8 | ... | ... | 63·7 | 60·9 |
| October ... ... | ... | ... | ... | 79·4 | 38·4 | 41·0 | 70·7 | 46·4 | 24·3 | 58·5 | ... | ... | 60·3 | 57·2 |
| November ... ... | ... | ... | ... | 58·2 | 28·8 | 29·4 | 53·5 | 32·5 | 21·0 | 43·0 | ... | ... | 46·0 | 44·2 |
| December ... ... | ... | ... | ... | 59·4 | 12·2 | 47·2 | 54·8 | 26·7 | 28·1 | 40·7 | ... | ... | 36·6 | 35·2 |
| Yearly Sums, Means, and Totals ... | ... | ... | ... | 67·9 | 37·6 | 30·3 | 62·5 | 42·4 | 20·1 | 52·4 | ... | ... | 50·9 | 49·2 |

No. XXII.—*continued.*

Long. 4° 48′ W. Height above Sea 450 feet.

| Hygrometrical Results from Glaisher's Tables (3rd edition). | | | | | | Atmospherical Conditions. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | In a Cubic Foot of Air. | | | Mean Weight of Cubic Foot of Air. | Number of Days for mean Direction of Wind. | | | | Number of calm, or nearly calm, Days. | Calculated from Robinson's Anemometer. | | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of Days on which Rain fell. | Amount of Rain fall. | |
| | | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean Degree of Humidity. | | North. | East. | South. | West. | | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | | | | On the Ground. | Feet above the 25 Ground. |
| | | | | | | | | | | | lbs. per sq. foot. | Miles. | | | | Inches. | Inches. |
| 34·4 | ·199 | 2·3 | 0·5 | 83·2 | 546·0 | 3·00 | 4·00 | 16·25 | 6·75 | 1·00 | ... | 255·5 | 7·2 | 4·3 | 13 | 3·01 | 2·35 |
| 33·6 | ·194 | 2·2 | 0·5 | 83·0 | 544·8 | 4·50 | 10·25 | 8·00 | 5·25 | 0·00 | ... | 291·6 | 7·8 | 3·8 | 12 | 2·05 | 1·63 |
| 38·5 | ·233 | 2·7 | 0·6 | 81·5 | 544·3 | 9·50 | 7·50 | 5·75 | 6·75 | 1·50 | ... | 223·4 | 7·2 | 4·6 | 12 | 2·52 | 1·99 |
| 44·2 | ·292 | 3·3 | 0·1 | 76·9 | 536·2 | 5·25 | 1·00 | 9·75 | 13·00 | 1·00 | ... | 234·5 | 5·7 | 4·9 | 10 | 1·21 | 1·03 |
| 49·1 | ·349 | 4·0 | 0·9 | 80·6 | 530·6 | 5·00 | 2·50 | 14·00 | 9·50 | 0·00 | ... | 357·1 | 6·8 | 5·7 | 16 | 2·90 | 1·85 |
| 55·4 | ·440 | 4·9 | 0·9 | 84·3 | 526·6 | 7·50 | 2·25 | 6·75 | 13·50 | 0·00 | ... | 272·2 | 6·7 | 4·2 | 8 | 1·32 | 1·17 |
| 59·7 | ·513 | 5·6 | 1·3 | 82·3 | 518·7 | 5·25 | 4·00 | 10·25 | 11·50 | 0·00 | ... | 259·5 | 5·5 | 3·2 | 8 | 0·72 | 0·60 |
| 56·3 | ·455 | 5·0 | 1·8 | 73·5 | 520·2 | 11·75 | 7·25 | 5·50 | 6·50 | 0·00 | ... | 213·6 | 4·3 | 4·0 | 9 | 2·00 | 1·75 |
| 52·6 | ·398 | 4·4 | 1·3 | 78·4 | 525·6 | 3·50 | 2·75 | 13·75 | 10·00 | 0·00 | ... | 273·5 | 6·1 | 4·2 | 12 | 4·20 | 4·08 |
| 45·3 | ·303 | 3·4 | 0·7 | 81·9 | 528·9 | 5·50 | 3·75 | 10·75 | 11·00 | 0·00 | ... | 341·9 | 6·4 | 4·5 | 16 | 5·30 | 4·90 |
| 36·8 | ·220 | 2·5 | 0·6 | 82·9 | 540·0 | 7·00 | 4·00 | 10·75 | 8·25 | 0·00 | ... | 246·9 | 6·4 | 3·5 | 9 | 1·25 | 1·05 |
| 30·0 | ·166 | 1·9 | 0·4 | 81·0 | 551·6 | 10·00 | 6·75 | 8·25 | 6·00 | 0·00 | ... | 236·7 | 6·7 | 3·8 | 7 | 1·52 | 1·34 |
| 44·7 | ·316 | 3·5 | 0·7 | 80·7 | 534·4 | 77·75 | 56·00 | 119·75 | 108·00 | 3·50 | ... | 267·2 | 6 4 | 4·2 | 132 | 28·00 | 23·74 |

Long. 6° 20′ W. Height above Sea 72 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36·4 | ·215 | 2·5 | 0·5 | 83·0 | 550·2 | 4·75 | 1·50 | 7·75 | 17·00 | 0·00 | ... | 118·8 | 7·0 | 3·4 | 15 | 2·03 | ... |
| 35·3 | ·206 | 2·4 | 0·6 | 80·5 | 549·1 | 7·25 | 6·50 | 5·00 | 9·25 | 0·00 | ... | 143·6 | 7·7 | 3·3 | 17 | 1·27 | ... |
| 38·5 | ·233 | 2·7 | 0·7 | 78·0 | 549·7 | 8·75 | 4·00 | 5·00 | 12·25 | 1·00 | ... | 112·2 | 6·9 | 5·7 | 13 | 1·49 | ... |
| 44·9 | ·299 | 3·4 | 1·2 | 74·9 | 541·3 | 5·75 | 2·50 | 6·00 | 15·25 | 0·50 | ... | 118·4 | 5·2 | 6·2 | 9 | 0·96 | ... |
| 48·6 | ·343 | 3·9 | 1·2 | 74·9 | 534·6 | 5·25 | 3·25 | 9·50 | 13·00 | 0·00 | ... | 111·7 | 6·6 | 5·2 | 15 | 1·00 | ... |
| 53·5 | ·411 | 4·6 | 1·8 | 72·5 | 530·8 | 5·00 | 1·00 | 3·75 | 19.75 | 0·50 | ... | 88·3 | 6·1 | 5·3 | 7 | 0·90 | ... |
| 56·7 | ·461 | 5.1 | 1·8 | 73·5 | 525·2 | 3·50 | 5·50 | 7·00 | 14·50 | 0·50 | ... | 74·8 | 6·2 | 4·9 | 8 | 0·90 | ... |
| 58·2 | ·452 | 5·0 | 1·8 | 73·5 | 526·3 | 3·75 | 6·75 | 8·75 | 11·75 | 0·00 | ... | 49·3 | 4·2 | 5·1 | 6 | 1·51 | ... |
| 52·4 | ·394 | 4·4 | 1·5 | 73·8 | 530·4 | 2·00 | 3·25 | 10·00 | 14·75 | 0·00 | ... | 73·5 | 5·9 | 4·2 | 9 | 1·85 | ... |
| 46·1 | ·313 | 3·5 | 0·9 | 80·2 | 534·0 | 3·00 | 3.25 | 10·25 | 14·00 | 0·50 | ... | 126·2 | 6·3 | 4·6 | 18 | 5·21 | ... |
| 38·2 | ·230 | 2·7 | 0·5 | 82·8 | 546·3 | 3·00 | 4·25 | 8·00 | 14·75 | 0·00 | ... | 84·2 | 5·4 | 4·3 | 10 | 1·23 | ... |
| 32·8 | ·187 | 2·2 | 0·4 | 85·6 | 556·2 | 6·00 | 5·25 | 8·00 | 11·75 | 0·00 | ... | 86·2 | 6·5 | 2·9 | 7 | 1·82 | ... |
| 44·9 | ·312 | 3·5 | 1·1 | 77·6 | 541·0 | 58·00 | 47·00 | 89·00 | 168·00 | 3·00 | ... | 98·9 | 6·2 | 4·6 | 134 | 20·17 | ... |

Long. 8° 18′ W. Height above Sea 176 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36·8 | ·219 | 2·5 | 0·7 | 78·4 | ... | 8·50 | 10·00 | 7·50 | 5·00 | 0·00 | ... | ... | 5·9 | 6·0 | 25 | 5·98 | ... |
| 35·3 | ·206 | 2·4 | 0·6 | 80·5 | ... | 11·00 | 9·00 | 4·00 | 4·00 | 0·00 | ... | ... | 6·6 | 6·2 | 12 | 3·02 | ... |
| 40·0 | ·248 | 2·8 | 0·7 | 81·4 | ... | 4·00 | 10·50 | 8·50 | 8·00 | 0·00 | ... | ... | 4·3 | 6·1 | 15 | 3·58 | ... |
| 46·2 | ·314 | 3·6 | 0·6 | 84·8 | ... | 2·00 | 5·00 | 12·50 | 10·50 | 0·00 | ... | ... | 3·1 | 5·4 | 8 | 0·09 | ... |
| 45·4 | ·305 | 3·4 | 0·4 | 89·5 | ... | 5·50 | 8·00 | 10·00 | 7·50 | 0·00 | ... | ... | 4·7 | 5·2 | 16 | 3·28 | ... |
| 53·5 | ·410 | 4·6 | 1·0 | 82·2 | ... | 7·50 | 6·00 | 5·00 | 11·50 | 0·00 | ... | ... | 3·3 | 3·2 | 2 | 0·05 | ... |
| 57·3 | ·470 | 5·2 | 1·2 | 82·8 | ... | 6·00 | 4·00 | 9·00 | 12·00 | 0·00 | ... | ... | 3·8 | 3·9 | 3 | 0·13 | ... |
| 56·9 | ·464 | 5·1 | 1·2 | 82·0 | ... | 2·00 | 7·50 | 10·00 | 11·50 | 0·00 | ... | ... | 3·5 | 3·9 | 4 | 0·15 | ... |
| 58·6 | ·494 | 5·5 | 1·0 | 83·9 | ... | 2·00 | 11·50 | 4·00 | 12·50 | 0·00 | ... | ... | 4·6 | 4·3 | 15 | 2·74 | ... |
| 54·5 | ·425 | 4·7 | 1·1 | 81·7 | ... | 2·00 | 6·00 | 6·50 | 16·50 | 0·00 | ... | ... | 4·8 | 5·1 | 20 | 2·45 | ... |
| 42·1 | ·269 | 3·1 | 0·5 | 87·4 | ... | 7·00 | 2·00 | 7·00 | 14·00 | 0·00 | ... | ... | 5·2 | 6·0 | 13 | 0·48 | ... |
| 33·2 | ·190 | 2·2 | 0·4 | 88·0 | ... | 9·25 | 10·75 | 4·25 | 6·75 | 0·00 | ... | ... | 5·4 | 6·1 | 9 | 2·81 | ... |
| 46·3 | ·334 | 3·8 | 0·8 | 83·5 | ... | 66·75 | 90·25 | 88·25 | 119·75 | 0·00 | ... | ... | 4·6 | 5·1 | 142 | 24·74 | ... |

Appendix

TEMPLEMORE. Lat. 52° 48′ N.

| Month. | Readings of the Barometer. | | | Temperature of the Air | | | | | | | Mean Daily Readings of | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean reduced and corrected to 32°. | Highest reduced and corrected to 32°. | Lowest reduced and corrected to 32°. | Highest during Month. | Lowest during Month. | Range during Month. | Mean | | | | Maximum in Sun's rays. | Minimum on Grass. | Hygrometer. | |
| | | | | | | | Of all the highest. | Of all the lowest. | Daily Range. | Approximate Temperature. | | | Dry Bulb. | Wet Bulb. |
| January ... ... | ... | ... | ... | 50·0 | 15·0 | 35·0 | 39·4 | 24·4 | 15·0 | 31·9 | 54·1 | ... | 35·3 | 33·7 |
| February ... ... | ... | ... | ... | 50·0 | 17·0 | 33·0 | 42·7 | 28·7 | 14·0 | 35·7 | 57·5 | ... | 36·1 | 33·7 |
| March .. ... ... | ... | ... | ... | 60·0 | 26·0 | 34·0 | 49·4 | 37·6 | 11·8 | 43·5 | 67·3 | ... | 43·0 | 39·3 |
| April ... ... ... | ... | ... | ... | 70·0 | 46·0 | 24·0 | 61·9 | 54·1 | 7·8 | 58·0 | wrong | ... | 51·0 | 46·0 |
| May ... ... ... | ... | ... | ... | 77·0 | 46·0 | 31·0 | 70·0 | 57·9 | 12·1 | 63·9 | ,, | ... | 54·0 | 50·0 |
| June ... ... ... | ... | ... | ... | 85·0 | 54·0 | 31·0 | 80·5 | 66·4 | 14·1 | 73·4 | 123·0 | ... | 64·0 | 58·0 |
| July ... ... ... | ... | ... | ... | 87·0 | 60·0 | 27·0 | 83·0 | 69·1 | 13·9 | 76·0 | 135·4 | ... | 65·0 | 60·0 |
| August ... ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| September ... ... | ... | ... | ... | 92·0 | 50·0 | 42·0 | 87·9 | 59·6 | 28·3 | 73·7 | 134·0 | ... | 62·0 | 55·5 |
| October... ... | ... | ... | ... | 78·0 | 25·0 | 53·0 | 57·7 | 40·7 | 17·0 | 49·2 | 87·7 | ... | 51·2 | 49·0 |
| November ... ... | ... | ... | ... | 56·0 | 24·0 | 32·0 | 47·8 | 31·5 | 16·3 | 39·6 | 71·8 | ... | 42·0 | 40·5 |
| December ... ... | ... | ... | ... | 52·0 | 13·0 | 39·0 | 40·7 | 24·4 | 16·3 | 32·5 | 52·3 | ... | 34·5 | 33·0 |
| Yearly Sums, Means, and Totals ... | ... | ... | ... | 68·8 | 34·2 | 34·6 | 60·0 | 44·9 | 15·1 | 52·5 | ... | ... | 48·9 | 45·3 |

*Abstract of Results of Meteorological Observations*

| Stations, with their Height above the Sea. | Readings of the Barometer. | | | Temperature of the Air. | | | | | | | Mean Daily Readings of | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean reduced and corrected to 32°. | Highest reduced and corrected to 32°. | Lowest reduced and corrected to 32°. | Highest during Year. | Lowest during Year. | Range during Year. | Mean | | | | Maximum in Sun's rays. | Minimum on Grass. | Hygrometer. | |
| | | | | | | | Of all the highest. | Of all the lowest. | Daily Range. | Approximate Temperature. | | | Dry Bulb. | Wet Bulb. |
| Belfast ... 50 ft. | 29·845 | 30·556 | 28·419 | 83·5 | 8·0 | 75·5 | 59·3 | 40·3 | 19·0 | 49·8 | ... | ... | 51·5 | 48·3 |
| Buttevant ... ... | ... | ... | ... | 88·2 | 13·5 | 74·7 | 58·5 | 38·4 | 20·1 | 48·4 | ... | ... | 52·2 | 48·5 |
| Cork ... 257 ft. | 29·660 | 30·204 | 28·576 | 85·0 | 18·0 | 67·0 | 59·3 | 38·1 | 21·2 | 48·7 | 75·1 | 31·0 | 53·9 | 49·7 |
| Curragh Camp 450 ,, | 29·473 | 30·110 | 28·227 | 86·1 | 10·5 | 75·6 | 57·4 | 38·6 | 18·8 | 48·0 | 81·3 | ... | 50·5 | 47·7 |
| Dublin ... 72 ,, | 29·311 | 30·467 | 28·530 | 86·2 | 13·8 | 72·4 | 57·7 | 40·5 | 17·2 | 49·1 | 94·8 | 37·0 | 51·9 | 49·1 |
| Fermoy ... 176 ,, | ... | ... | ... | 84·6 | 12·2 | 72·4 | 62·5 | 42·4 | 20·1 | 52·4 | ... | ... | 50·9 | 49·2 |
| Templemore ... ... | ... | ... | ... | 92·0 | 13·0 | 79·0 | 60·0 | 44·9 | 15·1 | 52·4 | 87·0 | ... | 48·9 | 45·3 |

No. XXII—*continued.*

Long. 7° 49′ W. Height above Sea feet.

| Hygrometrical Results from Glaisher's Tables (3rd edition). | | | | | | Atmospherical Conditions. | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | In a Cubic Foot of Air. | | | Mean Weight of Cubic Foot of Air. | Number of Days for mean Direction of Wind. | | | | Number of calm or nearly calm, Days. | Calculated from Robinson's Anemometer. | | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of Days on which Rain fell. | Amount of Rain fall | |
| | | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean Degree of Humidity. | | North. | East. | South. | West. | | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | | | | On the Ground. | Feet above the Ground. |
| 31·2 | ·176 | 1·1 | 0·4 | 84·6 | ... | 14·75 | 4·75 | 7·25 | 4·25 | 0·00 | ... | ... | 4·3 | 4·1 | 12 | 2·98 | ... |
| 30·1 | ·169 | 1·9 | 0·6 | 79·0 | ... | 7·75 | 3·75 | 11·00 | 5·50 | 0·00 | ... | ... | 4·7 | 3·7 | 3 | 0·94 | ... |
| 34·9 | ·202 | 2·4 | 0·8 | 73·1 | ... | 5·25 | 6·25 | 13·50 | 6·00 | 0·00 | ... | ... | 3·9 | 3·5 | 9 | 1·71 | ... |
| 40·8 | ·255 | 2·9 | 1·3 | 68·0 | ... | 4·50 | 7·00 | 10·50 | 8·00 | 0·00 | ... | ... | 3·3 | 3·1 | 7 | 1·11 | ... |
| 46·1 | ·310 | 3·5 | 1·2 | 74·0 | ... | 4·50 | 6·25 | 10·00 | 10·25 | 0·00 | ... | ... | 3·7 | 3·4 | 17 | 2·51 | ... |
| 53·0 | ·403 | 4·5 | 2·1 | 67·0 | ... | 5·00 | 4·75 | 12·25 | 8·00 | 0·00 | ... | ... | 3·9 | 3·7 | 7 | 0·36 | ... |
| 55·9 | ·447 | 4·9 | 1·9 | 73·0 | ... | 2·25 | 5·25 | 11·25 | 12·25 | 0·00 | ... | ... | 3·8 | 3·3 | 10 | 0·36 | ... |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 49·9 | ·359 | 4·0 | 2·2 | 64·5 | ... | 2·25 | 6·00 | 10·00 | 14·75 | 0·00 | ... | ... | 4·4 | 3·8 | 20 | 4·86 | ... |
| 46·7 | ·321 | 3·6 | 0·7 | 84·8 | ... | 4·75 | 0·75 | 8·00 | 17·50 | 0·00 | ... | ... | 5·5 | 4·4 | 22 | 6·75 | ... |
| 38·6 | ·235 | 2·7 | 0·4 | 88·5 | ... | 5·75 | 1·50 | 9·50 | 13·25 | 0·00 | ... | ... | 5·3 | 5·0 | 19 | 2·00 | ... |
| 30·5 | ·170 | 2·0 | 0·3 | 86·5 | .. | 8·50 | 8·75 | 5·75 | 8·00 | 0·00 | ... | ... | 6·5 | 5·7 | 11 | 2·60 | ... |
| 41·6 | ·277 | 3·0 | 1·1 | 76·4 | ... | 65·25 | 55·00 | 109·00 | 104·75 | 0·00 | ... | ... | 4·5 | 3·9 | 137 | 25·18 | ... |
| | | | | | | 334 days | | | | | | | | | | | |

taken at Stations in Ireland in the Year 1870.

| Hygrometrical Results from Glaisher's Tables (3rd edition). | | | | | | Atmospherical Conditions. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | In a Cubic Foot of Air. | | | Mean Weight of Cubic Foot of Air. | Number of Days for mean Direction of Wind. | | | | Number of calm, or nearly calm, Days. | Calculated from Robinson's Anemometer. | | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of Days on which Rain fell. | Rain fall on the Ground. | Latitude. | Longitude. |
| | | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean Degree of Humidity. | | North. | East. | South. | West. | | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | | | | | | |
| | | | | | | | | | | | lbs. per sq. foot | Miles | | | | Inches | ° ′ | ° ′ |
| 45·1 | ·315 | 3·5 | 1·0 | 79·8 | 541·8 | 71·50 | 60·50 | 78·50 | 115·50 | 38·00 | ... | 104·4 | 4·7 | 1·7 | 170 | 33·21 | 54 36N. | 5 57 W. |
| 44·9 | ·309 | 3·5 | 1·4 | 77·2 | ... | 57·00 | 65·25 | 113·25 | 80·00 | 48·50 | ... | ... | 6·7 | 4·0 | 167 | 31·35 | 52 14 ,, | 8 40 ,, |
| 45·4 | ·323 | 3·6 | 1·3 | 73·3 | 534·4 | 94·50 | 34·75 | 97·25 | 138·50 | 0·00 | ... | 145·8 | 6·9 | 4·6 | 131 | 43·02 | 51 53 ,, | 8 20 ,, |
| 44·7 | ·316 | 3·5 | 0·7 | 80·7 | 534·4 | 77·75 | 76·00 | 119·75 | 108·00 | 3·50 | ... | 267·2 | 6·4 | 4·2 | 132 | 28·00 | 53 8 ,, | 4 48 ,, |
| 44·9 | ·312 | 3·5 | 1·1 | 77·6 | 541·0 | 58·00 | 47·00 | 89·00 | 168·00 | 3·00 | ... | 98·9 | 6·2 | 4·6 | 134 | 20·17 | 53 25 ,, | 6 20 ,, |
| 46·3 | ·334 | 3·8 | 0·8 | 83·5 | ... | 66·75 | 90·25 | 88·25 | 119·75 | 0·00 | ... | ... | 4·6 | 5·1 | 142 | 24·74 | 52 2 ,, | 8 18 ,, |
| 41·6 | ·277 | 3·0 | 1·1 | 76·4 | ... | 65·25 | 55·00 | 109·00 | 104·75 | 0·00 | ... | ... | 4·5 | 3·9 | 137 | 25·18 | 52 48 ,, | 7 49 ,, |

APPENDIX

## Abstract of Results of Meteorological Observations

### FORT NAPIER, NATAL. Lat. 29° 30′ S.

| Month. | Readings of the Barometer. | | | Temperature of the Air. | | | | | | | Mean Daily Readings of | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Mean. | | | | | | Hygrometer | |
| | Mean reduced and corrected to 32°. | Height reduced and corrected to 32°. | Lowest reduced and corrected to 32°. | Highest during Month. | Lowest during Month. | Range during Month. | Of all the highest. | Of all the lowest. | Daily Range. | Approximate Temperature. | Maximum in Sun's rays. | Minimum on Grass. | Dry Bulb. | Wet Bulb. |
| January ... ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| February ... ... | 27·525 | 27·688 | 27·267 | 101·0 | 54·0 | 47·0 | 91·6 | 61·1 | 30·5 | 76·3 | ... | ... | 82·6 | 64·7 |
| March ... ... | 27·612 | 27·827 | 27·283 | 99·0 | 49·0 | 50·0 | 88·5 | 58·1 | 30·4 | 73·3 | ... | ... | 79·3 | 63·0 |
| April ... ... | 27·693 | 27·904 | 27·369 | 96·0 | 42·0 | 54·0 | 81·9 | 51·8 | 30·1 | 66·8 | ... | ... | 76·6 | 63·1 |
| May ... ... | 27·721 | 27·894 | 27·490 | 81·0 | 40·0 | 41·0 | 79·2 | 45·6 | 33·6 | 62·4 | ... | ... | 70·6 | 60·4 |
| June ... ... | 27·795 | 28·104 | 27·424 | 81·5 | 35·0 | 46·5 | 74·6 | 40·4 | 34·2 | 57·5 | ... | ... | 67·5 | 57·2 |
| July ... ... | 27·765 | 28·101 | 27·384 | 81·5 | 33·0 | 48·5 | 72·0 | 41·2 | 30·8 | 56·6 | ... | ... | 65·7 | 55·8 |
| August ... ... | 27·702 | 28·000 | 27·338 | 89·0 | 37·0 | 52·0 | 73·7 | 47·3 | 26·4 | 60·5 | ... | ... | 65·4 | 57·5 |
| September ... | 27·721 | 27·973 | 27·254 | 95·0 | 37·0 | 58·0 | 79·1 | 50·8 | 28·3 | 64·9 | ... | ... | 69·9 | 60·3 |
| October... ... | 27·678 | 28·084 | 27·394 | 102·0 | 48·0 | 54·0 | 76·7 | 54·3 | 22·4 | 65·5 | ... | ... | 69·0 | 61·5 |
| November ... | 27·636 | 27·897 | 27·344 | 92·0 | 45·0 | 47·0 | 78·3 | 54·7 | 23·6 | 66·5 | ... | ... | 69·0 | 63·0 |
| December ... ... | 27·577 | 28·817 | 27·113 | 101·0 | 52·0 | 49·0 | 83·4 | 57·6 | 25·8 | 70·5 | ... | ... | 74·4 | 65·8 |
| Sums, Means, and Totals ... | 27·675 | 28·026 | 27·333 | 92·6 | 42·9 | 49·7 | 79·9 | 51·2 | 28·7 | 65·5 | ... | ... | 71·8 | 62·0 |

### HONG KONG. Lat. 22° 16′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | 30·091 | 30·260 | 29·942 | 76·0 | 42·0 | 34·0 | 67·8 | 54·1 | 13·7 | 60·9 | 94·0 | 47·0 | 60·9 | 55·4 |
| February ... ... | 30·103 | 30·223 | 30·005 | 76·0 | 46·0 | 30·0 | 67·9 | 53·1 | 14·8 | 60·5 | 100·8 | 47·8 | 60·0 | 54·0 |
| March ... ... | 30·032 | 30·196 | 29·893 | 81·0 | 47·0 | 34·0 | 73·9 | 61·5 | 12·4 | 67·7 | 102·8 | 57·1 | 68·5 | 64·0 |
| April ... ... | 29·958 | 30·112 | 29·725 | 92·0 | 62·0 | 30·0 | 83·3 | 70·7 | 12·6 | 77·0 | 125·2 | 65·4 | 77·3 | 71·3 |
| May ... ... | 29·864 | 30·044 | 29·698 | 96·0 | 68·0 | 28·0 | 86·4 | 73·9 | 12·5 | 80·1 | 120·7 | 69·8 | 80·9 | 76·1 |
| June ... ... | 29·795 | 29·887 | 29·669 | 99·0 | 76·0 | 23·0 | 94·9 | 78·4 | 16·5 | 86·6 | 139·4 | 74·4 | 87·[illegible] | 80·[illegible] |
| July ... ... | 29·670 | 29·821 | 29·424 | 100·0 | 76·0 | 24·0 | 95.4 | 79·4 | 16·0 | 87·4 | 137·0 | 74·2 | 88·4 | 81·3 |
| August ... ... | 29·685 | 29·925 | 29·531 | 98·0 | 74·0 | 24·0 | 92·1 | 77·2 | 14·9 | 84·6 | 136·3 | 72·9 | 85·5 | 79·0 |
| September ... | 29·733 | 29·920 | 29·841 | 95·0 | 73·0 | 22·0 | 87·7 | 74·7 | 13·0 | 81·2 | 121·6 | 69·8 | 82·2 | 75·6 |
| October... ... | 29·892 | 30·063 | 29·683 | 89·0 | 66·0 | 23·0 | 84·4 | 71·9 | 12·5 | 78·1 | 120·2 | 65·1 | 78·9 | 71·6 |
| November ... | 30·004 | 30·261 | 29·512 | 84·0 | 52·0 | 32·0 | 74·4 | 62·0 | 12·4 | 68·2 | 103·3 | 55·2 | 69·6 | 61·0 |
| December ... ... | 30·021 | 30·271 | 29·814 | 77·0 | 43·0 | 34·0 | 70·5 | 56·1 | 14·4 | 63·3 | 83·5 | 46·9 | 65·5 | 57·1 |
| Yearly Sums, Means, and Totals ... | 29·904 | 30·082 | 29·648 | 83·4 | 60·2 | 23·2 | 81·5 | 67·7 | 13·8 | 74·6 | 123·7 | 62·1 | 75·4 | 69·1 |

### SINGAPORE. Lat. 1° 17′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | 29·771 | 29·910 | 29·611 | 87·0 | 69·5 | 17·5 | 84·1 | 71·9 | 12·2 | 78·0 | 139·0 | 69·4 | 78·7 | 74·8 |
| February ... ... | 29·807 | 29·950 | 29·679 | 87·5 | 70·0 | 17·5 | 83·9 | 72·5 | 11·4 | 78·2 | 141·2 | 69·4 | 79·3 | 75·0 |
| March ... ... | 29·847 | 29·912 | 29·675 | 90·0 | 71·0 | 19·0 | 87·1 | 73·0 | 14·1 | 80·0 | 157·0 | 70·2 | 82·0 | 76·6 |
| April ... ... | 29·771 | 29·889 | 29·647 | 90·5 | 72·0 | 18·5 | 87·9 | 74·6 | 13·3 | 81·2 | 155·0 | 72·3 | 83·9 | 77·7 |
| May ... ... | 29·770 | 29·880 | 29·621 | 93·0 | 72·5 | 20·5 | 87·8 | 74·6 | 13·2 | 81·2 | 156·0 | 74·2 | 84·1 | 76·2 |
| June ... ... | 29·788 | 29·958 | 29·661 | 89·0 | 71·0 | 18·0 | 85·8 | 74·1 | 11·7 | 79·9 | 148·0 | 71·7 | 82·0 | 77·0 |
| July ... ... | 29·797 | 29·894 | 29·701 | 90·5 | 71·0 | 19·5 | 86·9 | 74·3 | 12·6 | 80·6 | broken | 71·3 | 83·3 | 77·0 |
| August ... ... | 29·746 | 29·909 | 29·655 | 89·0 | 71·0 | 18·0 | 85·7 | 74·0 | 11·7 | 79·8 | ,, | 71·9 | 82·3 | 76·6 |
| September ... | 29·866 | 29·919 | 29·706 | 91·0 | 71·0 | 20·0 | 85·8 | 73·7 | 12·1 | 79·7 | ,, | 70·9 | 82·3 | 77·2 |
| October... ... | 29·818 | 29·975 | 29·665 | 90·5 | 71·0 | 19·5 | 86 4 | 73·1 | 13·3 | 79·7 | 155·0 | 70·6 | 82·7 | 76·3 |
| November ... | 29·817 | 29·983 | 29·682 | 90·0 | 71·5 | 18·5 | 86·2 | 73·6 | 12·6 | 79·9 | 155·0 | 71·4 | 81·5 | 74·7 |
| December ... ... | 29·831 | 29·973 | 29·619 | 88·0 | 69·0 | 19·0 | 83·2 | 72·1 | 11·7 | 77·9 | 135·5 | 69·4 | 79·8 | 73·7 |
| Yearly Sums, Means, and Totals ... | 29·802 | 29·929 | 29·710 | 89·7 | 70·9 | 18·8 | 85·9 | 73·5 | 12·4 | 79·7 | ... | 71·1 | 81·8 | 75·5 |

No. XXIII.

taken at Stations in Cape of Good Hope, Gambia, and China, in the year 1870.

Long. 30° 2′ E. Height above Sea 2,200 feet.

| Hygrometrical Results from Glaisher's Tables (3rd edition). | | | | | | Atmospherical Conditions. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | In a Cubic Foot of Air. | | | | Number of Days for mean Direction of Wind. | | | | | Calculated from Robinson's Anemometer. | | | | | Amount of Rain fall. | |
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean Degree of Humidity. | Mean Weight of Cubic Foot of Air. | North. | East. | South. | West. | Number of calm, or nearly calm, Days. | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of Days on which Rain fell. | On the Ground. | 24 Feet above the Ground. |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | lbs. per sq. foot | Miles | ... | ... | ... | Inches | Inches |
| 52·7 | ·399 | 4·2 | 7·6 | 35·9 | 459·6 | 5·00 | 17·00 | 4·25 | 1·75 | 0·00 | ... | ... | 3·4 | 4·8 | 11 | 8·74 | ... |
| 51·8 | ·386 | 4·2 | 6·5 | 38·4 | 474·1 | 4·00 | 21·00 | 4·75 | 1·25 | 0·00 | ... | ... | 3·8 | 4·9 | 11 | 4·92 | ... |
| 53·6 | ·413 | 4·5 | 5·4 | 45·1 | 477·4 | 3·25 | 22·00 | 4·75 | 0·00 | 0·00 | ... | ... | 2·7 | 4·7 | 15 | 6·22 | ... |
| 52·6 | ·397 | 4·4 | 3·8 | 52·8 | 483·4 | 3·75 | 22·75 | 4·25 | 0·25 | 0·00 | ... | ... | 2·0 | 4·6 | 3 | 0·36 | ... |
| 49·0 | ·348 | 3·8 | 3·6 | 50·8 | 487·9 | 3·75 | 20·75 | 5·00 | 0·50 | 0·00 | ... | ... | 3·7 | 9·6 | ... | ... | ... |
| 47·7 | ·331 | 3·7 | 3·3 | 52·1 | 489·8 | 3·50 | 17·50 | 7·75 | 2·25 | 0·00 | ... | ... | 0·9 | 4·3 | 1 | 0·54 | ... |
| 51·1 | ·374 | 4·1 | 2·8 | 59·4 | 487·9 | 5·00 | 17·00 | 6·50 | 2·50 | 0·00 | ... | ... | 3·5 | 4·7 | 8 | 0·65 | ... |
| 52·9 | ·402 | 4·4 | 3·6 | 54·5 | 484·1 | 4·50 | 17·75 | 5·75 | 0·50 | 1·50 | ... | ... | 4·1 | 4·3 | 7 | 0·37 | ... |
| 55·6 | ·443 | 4·8 | 2·9 | 62·2 | 483·8 | 4·50 | 20·00 | 5·75 | 0·75 | 0·00 | ... | ... | 6·3 | 3·6 | 22 | 3·84 | ... |
| 58·3 | ·486 | 5·3 | 2·5 | 68·0 | 482·8 | 2·75 | 19·00 | 5·50 | 1·75 | 1·00 | ... | ... | 5·9 | 2·7 | 19 | 5·42 | ... |
| 59·6 | ·511 | 5·5 | 3·7 | 60·0 | 476·9 | 5·00 | 18·75 | 5·50 | 0·75 | 1·00 | ... | ... | 3·3 | 2·4 | 14 | 5·71 | ... |
| 53·2 | ·408 | 4·8 | 4·1 | 61:6 | 480·7 | 45·00 | 213·50 | 59·75 | 12·25 | 3·50 | ... | ... | 3·6 | 4·6 | 111 | 36·77 | ... |

Long. 114° 9′ E. Height above Sea 43 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50·6 | ·369 | 4·1 | 1·8 | 68·5 | 534·4 | 10·25 | 13·75 | 0·50 | 2·50 | 4·00 | ... | ... | 3·7 | 3·9 | .. | ... | ... |
| 48·7 | ·344 | 3·8 | 2·0 | 66·0 | 535·8 | 10·25 | 15·25 | 0·00 | 0·50 | 2·00 | ... | ... | 3·4 | 3·5 | ... | ... | ... |
| 60·4 | ·526 | 5·7 | 1·9 | 75·5 | 524·8 | 4·00 | 20·00 | 4·25 | 0·75 | 2·00 | ... | ... | 5·0 | 3·8 | 9 | 3·71 | 3·63 |
| 67·1 | ·665 | 7·2 | 2·9 | 71·0 | 514·1 | 1·50 | 18·00 | 7·25 | 3·25 | 0·00 | ... | ... | 4·9 | 4·3 | 7 | 1·24 | 0·96 |
| 72·8 | ·808 | 8·7 | 2·6 | 76·9 | 508·2 | 0·00 | 13·00 | 11·50 | 6·50 | 0·00 | ... | ... | 6·4 | 5·3 | 21 | 19·80 | 19·39 |
| 76·4 | ·895 | 9·4 | 4·5 | 68·2 | 501·0 | 0·00 | 9·00 | 13·25 | 7·75 | 0·00 | ... | ... | 5·2 | 5·5 | 23 | 5·92 | 5·17 |
| 76·8 | ·921 | 9·7 | 4·5 | 69·0 | 497·3 | 0·00 | 5·25 | 12·25 | 13·50 | 0·00 | ... | ... | 4·5 | 4·5 | 10 | 5·82 | 4·69 |
| 74·8 | ·864 | 9·1 | 3·9 | 70·0 | 500·6 | 0·00 | 13·75 | 6·00 | 10·25 | 1·00 | ... | ... | 4·3 | 5·1 | 13 | 14·48 | 12·30 |
| 71·2 | ·764 | 8·2 | 3·6 | 69·6 | 505·0 | 1·50 | 24·25 | 1·25 | 3·00 | 0·00 | ... | ... | 5·0 | 5·3 | 12 | 15·23 | 13·58 |
| 66·6 | ·653 | 7·0 | 3·6 | 66·7 | 511·4 | 11·25 | 16·50 | 0·00 | 2·75 | 0·50 | ... | ... | 3·6 | 4·6 | 9 | 3·90 | 3·36 |
| 54·4 | ·423 | 4·6 | 3·3 | 57·6 | 523·9 | 15·25 | 12·25 | 0·00 | 2·50 | 0·00 | ... | ... | 2·5 | 3·7 | 5 | 0·69 | 0·59 |
| 50·2 | ·363 | 4·0 | 2·9 | 57·4 | 528·8 | 11·00 | 16·75 | 0·25 | 1·50 | 2·50 | ... | ... | 1·2 | 2·8 | ... | ... | ... |
| 62·5 | ·633 | 6·5 | 3·1 | 68·0 | 523·8 | 65·00 | 176·75 | 56·50 | 54·75 | 12·00 | ... | ... | 4·2 | 4·1 | 109 | 70·79 | 63·67 |

Long. 103° 51′ E. Height above Sea feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 72·1 | ·790 | 8·5 | 2·0 | 80·2 | 508·7 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 24 | 18·25 | ... |
| 72·1 | ·787 | 8·4 | 1·9 | 78·8 | 508·8 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 21 | 7·80 | ... |
| 62·9 | ·574 | 6·1 | 5·6 | 52·8 | 508·3 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 14 | 3·15 | ... |
| 73·6 | ·828 | 8·8 | 3·6 | 71·2 | 503·7 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 17 | 8·81 | ... |
| 71·0 | ·758 | 8·1 | 4·2 | 64·5 | 504·0 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 10 | 5·01 | ... |
| 73·6 | ·830 | 8·9 | 2·8 | 76·0 | 505·7 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 17 | 11·51 | ... |
| 72·8 | ·805 | 8·3 | 3·6 | 70·8 | 504·8 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 11 | 5·11 | ... |
| 72·8 | ·806 | 8·6 | 2·8 | 73·2 | 504·9 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 17 | 11·36 | ... |
| 73·8 | ·833 | 8·9 | 2·9 | 75·6 | 506·7 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 18 | 12·62 | ... |
| 72·2 | ·785 | 8·4 | 3·5 | 70·4 | 505·9 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 17 | 9·99 | ... |
| 70·1 | ·737 | 7·8 | 3·6 | 70·6 | 507·3 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 25 | 11·50 | ... |
| 69·5 | ·723 | 7·7 | 3·2 | 70·6 | 509·2 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 18 | 18·13 | ... |
| 71·4 | ·771 | 7·2 | 3·3 | 71·2 | 506·5 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 209 | 123·24 | ... |

Appendix

Abstract of Results of Meteorological Observations

| Stations, with their Height above the Sea. | Readings of the Barometer. | | | Temperature of the Air. | | | | | | | Mean Daily Readings of | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Mean. | | | | | | Hygrometer. | |
| | Mean reduced and corrected to 32°. | Highest reduced and corrected to 32°. | Lowest reduced and corrected to 32°. | Highest during Year. | Lowest during Year. | Range during Year. | Of all the highest. | Of all the lowest. | Daily Range. | Approximate Temperature. | Maximum in Sun's rays. | Minimum on Grass. | Dry Bulb. | Wet Bulb. |
| feet | | | | | | | | | | | | | | |
| Fort Napier, Natal*... 2,157 | 27·675 | 28·817 | 27·113 | 101·0 | 33·0 | 68·0 | 79·5 | 51·2 | 28·7 | 65·5 | ... | ... | 71·8 | 62·0 |
| Hong Kong, China ... 43 | 29·904 | 30·271 | 29·424 | 100·0 | 42·0 | 58·0 | 81·5 | 67·7 | 13·8 | 74·6 | 123·7 | 62·1 | 75·4 | 69·1 |
| Singapore ... ... ... ... | 29·802 | 29·983 | 29·611 | 93·0 | 69·0 | 24·0 | 85·9 | 73·5 | 12·4 | 79·7 | ... | 71·1 | 81·8 | 75·5 |

* For 11 months only, commencing February.

No. XXIII—*continued.*

taken at Stations in Cape of Good Hope, China, and Straits Settlements, in the Year 1870.

| Hygrometrical Results from Glaisher's Tables (3rd edition) | | | | | | Atmospherical Conditions. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | In a Cubic Foot of Air. | | | | Number of Days for mean Direction of Wind. | | | | | Calculated from Robinson's Anemometer. | | | | | | | |
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean Degree of Humidity. | Mean Weight of Cubic Foot of Air. | North. | East. | South. | West. | Number of calm, or nearly calm, Days. | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of Days on which Rain fell. | Rainfall on the Ground. | Latitude. | Longitude. |
| | | | | | | | | | | | lbs. per sq. foot | Miles | | | | Inches | ° ′ | ° ′ |
| 53·2 | ·408 | 4·8 | 4·1 | 61·6 | 480·7 | 45·00 | 213·50 | 59·75 | 12·25 | 3·50 | ... | ... | 3·6 | 4·6 | 111 | 36·77 | 29 30 S. | 30 2 E. |
| 62·5 | ·633 | 6·5 | 3·1 | 68·0 | 523·8 | 65·00 | 176·75 | 56·50 | 54·75 | 12·00 | ... | ... | 4·2 | 4·1 | 109 | 76·79 | 22 16 N. | 114 9 ,, |
| 71·4 | ·771 | 7·2 | 3·3 | 71·2 | 506·5 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 209 | 123·24 | 1 17 ,, | 103 51 ,, |

Appendix

## Abstract of the Results of Meteorological Observations

HALIFAX, NOVA SCOTIA. Lat. 44° 39′ N.

| Month. | Readings of the Barometer. | | | Temperature of the Air. | | | | | | | Mean Daily Readings of | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean reduced and corrected to 32°. | Highest reduced and corrected to 32°. | Lowest reduced and corrected to 32°. | Highest during Month. | Lowest during Month. | Range during Month. | Mean | | | | Maximum in Sun's rays. | Minimum on Grass. | Hygrometer. | |
| | | | | | | | Of all the highest. | Of all the lowest. | Daily Range. | Approximate Temperature. | | | Dry Bulb. | Wet Bulb. |
| January ... ... | 29·911 | 30·528 | 28·579 | 51·0 | -3·0 | 54·0 | 38·9 | 17·7 | 21·2 | 28·3 | 66·7 | * | 31·1 | 30·2 |
| February ... ... | 29·660 | 30·339 | 28·679 | 48·2 | -3·0 | 51·2 | 34·6 | 13·8 | 20·8 | 24·2 | 65·5 | * | 26·6 | 25·8 |
| March ... ... ... | 29·661 | 30·292 | 29·095 | 51·9 | -6·0 | 57·9 | 37·3 | 17·5 | 19·8 | 27·4 | 76·3 | * | 31·5 | 30·2 |
| April ... ... ... | 29·256 | 30·389 | 29·256 | 66·4 | 20·0 | 46·4 | 50·8 | 30·8 | 20·0 | 40·8 | 85·7 | 29·1 | 43·9 | 41·4 |
| May ... ... ... | 29·745 | 30·262 | 28·971 | 81·0 | 27·2 | 53·8 | 62·0 | 34·3 | 27·7 | 48·1 | 98·9 | 32·8 | 51·2 | 47·1 |
| June ... ... ... | 29·718 | 30·146 | 29·311 | 85·1 | 39·8 | 45·3 | 71·3† | 46·7† | 24·6† | 59·0† | 110·6† | 43·1† | 62·2 | 55·8 |
| July ... ... ... | 29·757 | 30·043 | 29·473 | 92·3 | 40·5 | 51·8 | 79·1 | 53·3 | 26·8 | 66·2 | 126·2 | 49·8 | 70·1 | 64·1 |
| August ... ... ... | 29·754 | 30·005 | 28·975 | 88·5 | 45·0 | 43·5 | 78·3 | 57·3 | 21·0 | 67·8 | 124·6 | 52·9 | 70·2 | 63·0 |
| September ... ... | 29·886 | 30·340 | 28·822 | 82·4 | 35·0 | 47·4 | 69·4 | 45·6 | 23·8 | 57·5 | 113·1 | 40·9 | 61·6 | 56·0 |
| October ... ... | 29·852 | 30·431 | 29·293 | 71·2 | 26·0 | 45·2 | 60·3 | 39·6 | 20·7 | 49·9 | 94·1 | 35·6 | 51·6 | 47·3 |
| November ... ... | 29·649 | 30·324 | 29·036 | 61·6 | 18·0 | 43·6 | 45·9 | 30·8 | 15·1 | 38·3 | 72·7 | 26·8 | 40·9 | 38·5 |
| December ... ... | 29·540 | 30·386 | 29·992 | 48·2 | 3·7 | 44·5 | 36·4 | 22·2 | 14·2 | 29·3 | 57·7 | 20·7 | 31·4 | 29·4 |
| Yearly Sums, Means, and Totals ... | 29·698 | 30·290 | 29·040 | 69·0 | 20·4 | 48·6 | 55·3 | 34·1 | 21·2 | 44·7 | 91·0 | ... | 47·7 | 44·1 |

BARBADOES. Lat. 13° 14′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | Out of Order. | | | 86·5 | 68·0 | 18·5 | 84·7 | 70·7 | 14·0 | 77·7 | 128·0 | 62·9 | 80·4 | 72·6 |
| February ... ... | | | | 87·5 | 68·5 | 19·0 | 85·4 | 70·0 | 15·4 | 77·7 | 125·7 | 62·8 | 81·5 | 73·1 |
| March ... ... ... | | | | 89·5 | 67·0 | 22·5 | 86·8 | 69·4 | 17·4 | 78·1 | 105·0 | 60·6 | 82·4 | 73·2 |
| April ... ... ... | 30·032 | 30·132 | 29·904 | 88·4 | 69·0 | 19·4 | 86·8 | 71·4 | 15·4 | 79·1 | 140·0 | 63·0 | 83·2 | 74·5 |
| May ... ... ... | 29·984 | 30·125 | 29·936 | 91·0 | 71·2 | 19·8 | 88·6 | 73·0 | 15·6 | 80·8 | 136·0 | Lost | 84·[illegible] | 75·[illegible] |
| June ... ... ... | 29·998 | 30·094 | 28·893 | 90·2 | 70·2 | 20·0 | 88·3 | 73·1 | 15·2 | 80·7 | 141·0 | ,, | 82·7 | 75·0 |
| July ... ... ... | 29·983 | 30·602 | 22·882 | 89·5 | 70·0 | 19·5 | 87·5 | 73·0 | 14·5 | 80·2 | 140·0 | ,, | 84·2 | 76·5 |
| August ... ... ... | 29·896 | 30·018 | 29·829 | 91·0 | 70·0 | 21·0 | 88·5 | 73·0 | 15·5 | 80·7 | 150·0 | ,, | 84·9 | 79·2 |
| September ... ... | 30·216 | 30·725 | 29·926 | 92·5 | 69·0 | 23·5 | 89·7 | 73·1 | 16·6 | 81·4 | 149·9 | ,, | 85·7 | 77·7 |
| October ... ... | 30·102 | 30·728 | 29·685 | 91·5 | 70·0 | 21·5 | 88·7 | 72·7 | 16·0 | 80·7 | 141·6 | ,, | 85·4 | 77·2 |
| November ... ... | 29·895 | 30·032 | 29·797 | 89·0 | 69·0 | 20·0 | 87·1 | 71·6 | 15·5 | 79·3 | 133 6 | ,, | 82·8 | 76·0 |
| December ... ... | 29·919 | 30·032 | 29·809 | 87·0 | 67·3 | 19·7 | 86·0 | 70·5 | 15·5 | 78·2 | 138·2 | ,, | 82·4 | 74·7 |
| Sums, Means, and Totals ... | 30·003 | 30·296 | 29·751 | 89·4 | 69·1 | 20·3 | 87·3 | 71·8 | 15·5 | 79·5 | 135·7 | ,, | 83·3 | 75·4 |

NEWCASTLE, JAMAICA. Lat. 18° 6′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | 26·282 | 26·349 | 26·225 | 90·0 | 50·0 | 40·0 | 79·7 | 53·3 | 26·4 | 66·5 | 120·5 | 53·0 | 67·5 | 63·5 |
| February ... ... | 26·272 | 26·367 | 26·166 | 82·0 | 53·0 | 29·0 | 75·3 | 55·0 | 20·3 | 65·1 | 120·3 | 52·2 | 66·4 | 62·8 |
| March ... ... ... | 26·285 | 26·353 | 26·214 | 84·0 | 52·0 | 32·0 | 77·4 | 55·0 | 22·4 | 66·2 | Broken. | 51·9 | 67·5 | 63·8 |
| April ... ... ... | 26·292 | 26·359 | 26·164 | 86·0 | 46·0 | 40·0 | 78·0 | 55·0 | 23·0 | 66·5 | | 52·1 | 68·7 | 64·7 |
| May ... ... ... | Barometer condemned. | | | 87·0 | 45·0 | 42·0 | 78·7 | 54·3 | 24·4 | 66·5 | | 51·9 | 69·9 | 65·6 |
| June ... ... ... | | | | 83·0 | 48·0 | 35·0 | 78·6 | 52·1 | 26·5 | 65·3 | | 49·3 | 72·3 | 66·6 |
| July ... ... ... | 26·372 | 26·446 | 26·318 | 82·0 | 52·0 | 30·0 | 79·2 | 53·6 | 25·6 | 66·4 | | 52·9 | 72·6 | 67·3 |
| August ... ... ... | 26·355 | 26·500 | 26·281 | 84·0 | 50·0 | 34·0 | 81·1 | 53·1 | 28·0 | 67·1 | | 48·8 | 72·9 | 70·2 |
| September ... ... | 26·338 | 26·455 | 26·179 | 85·0 | 52·0 | 33·0 | 81·6‡ | 56·0‡ | 25·6‡ | 68·8‡ | | 52·2 | 73·8 | 70·1 |
| October ... ... | 36·197 | 26·314 | 26·993 | 80·0 | 56·0 | 24·0 | 75·2 | 58·7 | 16·5 | 66·9 | 131·1 | 57·1 | 69·0 | 65·7 |
| November ... ... | Out of Order. | | | 83·0 | 55·0 | 28·0 | 75·4 | 57·7 | 17·7 | 66·5 | 133·7 | 55·4 | 68·0 | 65·2 |
| December ... ... | | | | 80·0 | 52·0 | 28·0 | 75·4 | 56·6 | 18·8 | 66·0 | 139·3 | 52·7 | 68·0 | 64·5 |
| Yearly Sums, Means, and Totals ... | ... | ... | ... | 83·8 | 50·9 | 32·9 | 77·9 | 55·0 | 22·9 | 66·5 | ... | 52·4 | 69·7 | 65·8 |

* Not reliable. † June 29 days. ‡ For 26 days only.

No. XXIII—*continued.*

taken at Stations in North America and the West Indies, in the Year 1870.

Long. 63° 36′ W. Height above Sea 125 feet.

| Hygrometrical Results from Glaisher's Tables (3rd edition). | | | | | | Atmospherical Conditions. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | In a Cubic Foot of Air. | | | | Number of Days for mean Direction of Wind. | | | | | Calculated from Robinson's Anemometer. | | | | | Amount of Rain fall. | |
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean degree of Humidity. | Mean Weight of Cubic Foot of Air. | North. | East. | South. | West. | Number of calm, or nearly calm, days. | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of days on which rain fell. | On the Ground. | 10 Feet above the Ground. |
| | | | | | | | | | | | lbs. per sq. foot | Miles. | | | | Inches. | Inches. |
| 27·8 | ·152 | 1·8 | 0·3 | 86·0 | 564·9 | 10·00* | 1·75* | 6·00* | 6·25* | 0·00* | ... | 480·6 | 6·4 | 4·0 | 17 | 7·8 | 5·33R. 2·47S. |
| 22·1 | ·119 | 1·4 | 0·2 | 83·0 | 565·8 | 5·25† | 1·25† | 6·50† | 7·00† | 0·00† | ... | 367·5 | 6·7 | 3·1 | 14 | 9·76 | 5·41R. 4·35S. |
| 27·0 | ·147 | 1·7 | 0·4 | 82·0 | 559·9 | 12·00‡ | 8·50‡ | 2·00‡ | 2·50‡ | 0·00‡ | ... | ... | 6·1 | 3·1 | 7 | 3·60 | 2·75R. 0·85S. |
| 38·5 | ·243 | 2·7 | 0·6 | 80·9 | 548·3 | 6·75§ | 5·50§ | 10·50§ | 4·25§ | 0·00§ | ... | 397·3 | 5·7 | 1·7 | 12 | 4·48 | ... |
| 42·8 | ·276 | 3·1 | 1·1 | 73·6 | 539·1 | 7·25 | 5·50 | 13·75 | 4·50 | 0·00 | ... | 531·9 | 5·5 | 3·3 | 4 | 4·41 | ... |
| 50·3 | ·365 | 4·0 | 2·2 | 62·2 | 526·7 | 7·25‖ | 2·75‖ | 6·75‖ | 10·75‖ | 0·00‖ | ... | 452·2 | 4·8 | 2·9 | 5 | 2·58 | ... |
| 50·5 | ·510 | 5·5 | 2·5 | 69·0 | 518·6 | 5·00 | 0·00 | 5·00 | 12·00 | 0·00 | ... | 434·2 | 4·1 | 3·4 | 12 | 3·07 | 1·61 |
| 57·5 | ·473 | 5·2 | 2·9 | 64·2 | 518·7 | 3·50¶ | 0·50¶ | 8·25¶ | 10·25¶ | 0·00¶ | ... | 399·3 | 3·5 | 2·4 | 6 | 1·64 | 1·20 |
| 51·2 | ·373 | 4·2 | 1·9 | 69·0 | 530·1 | 12·75§ | 3·00§ | 3·75§ | 7·50§ | 0·00§ | ... | 245·7 | 4·7 | 3·3 | 10 | 4·42 | 3·06 |
| 42·9 | ·277 | 3·1 | 1·2 | 72·8 | 540·6 | 14·00 | 4·25 | 5·25 | 7·50 | 0·00 | ... | 381·8 | 5·2 | 2·6 | 9 | 4·96 | 4·02 |
| 36·9 | ·221 | 2·5 | 0·3 | 87·7 | 549·1 | 11·75 | 0·00 | 8·75 | 9·50 | 0·00 | ... | 458·3 | 8·0 | 1·8 | 17 | 8·26 | 6·52 |
| 24·4 | ·131 | 1·6 | 0·5 | 73·8 | 553·1 | 12·50 | 3·00 | 2·50 | 13·00 | 0·00 | ... | 374·9 | 7·6 | 2·8 | 14 | 6·17 | 4·20 |
| 40·1 | ·274 | 2·9 | 1·2 | 75·3 | 543·3 | ... | ... | ... | ... | ... | ... | ... | 5·7 | 2·9 | 127 | 61·10 | ... |

Long. 59° 40′ W. Height above Sea 15 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 67·3 | ·669 | 7·2 | 4·0 | 64·2 | ... | 15·50 | 15·50 | 0·00 | 0·00 | 0·00 | ... | 203·9 | 4·0 | 3·0 | 23 | 2·25 | 0·28 |
| 67·5 | ·672 | 7·2 | 4·4 | 62·9 | ... | 14·00 | 14·00 | 0·00 | 0·00 | 0·00 | ... | 205·8 | 4·5 | 3·7 | 15 | 0·85 | 0·08 |
| 67·1 | ·663 | 7·1 | 4·7 | 59·6 | ... | 15·00 | 15·00 | 0·50 | 0·00 | 0·00 | ... | 225·5 | 4·1 | 4·0 | 9 | 0·51 | 0·00 |
| 68·7 | ·701 | 7·5 | 4·6 | 61·4 | 509·5 | 13·00 | 16·00 | 1·00 | 0·00 | 0·00 | ... | 199·5 | 4·5 | 4·3 | 6 | 0·45 | 0·01 |
| 69·7 | ·727 | 7·7 | 4·8 | 61·1 | 507·7 | 15·00 | 15·00 | 0·50 | 0·00 | 0·00 | ... | 241·0 | 3·5 | 4·3 | 10 | 1·67 | 0·57 |
| 70·0 | ·729 | 7·8 | 4·1 | 65·2 | 509·3 | 14·00 | 15·00 | 1·00 | 0·00 | 0·00 | ... | 220·6 | 4·5 | 4·0 | 15 | 6·04 | 4·51 |
| 71·4 | ·790 | 8·2 | 4·3 | 65·4 | 507·4 | 15·50 | 15·50 | 0·00 | 0·00 | 0·00 | ... | 63·1 | 4·1 | 1·9 | 23 | 4·78 | 2·78 |
| 75·5 | ·884 | 9·3 | 3·4 | 73·2 | 502·8 | 10·00 | 17·00 | 4·00 | 0·00 | 0·00 | ... | 129·5 | 3·6 | 2·0 | 18 | 4·30 | 2·83 |
| 72·5 | ·800 | 8·4 | 4·6 | 64·7 | 509·8 | 9·00 | 18·00 | 3·00 | 0·00 | 0·00 | ... | 110·3 | 3·6 | 2·7 | 19 | 3·21 | 1·96 |
| 71·9 | ·783 | 8·3 | 4·7 | 63·6 | 508·2 | 5·0 | 18·00 | 8·00 | 0·00 | 0·00 | ... | 116·9 | 4·7 | 2·8 | 19 | 6·53 | 5·19 |
| 71·5 | ·769 | 8·3 | 3·7 | 68·8 | 507·1 | 10·00 | 20·00 | 0·00 | 0·00 | 0·00 | ... | 97·1 | 3·9 | 2·7 | 19 | 9·19 | 6·86 |
| 69·5 | ·723 | 7·7 | 4.1 | 65·6 | 508·2 | 15·50 | 15·50 | 0·00 | 0·00 | 0·00 | ... | 102·2 | 3·8 | 4·3 | 17 | 2·33 | 1·07 |
| 70·2 | ·741 | 7·9 | 4·3 | 64·6 | ... | 151·50 | 195·50 | 18·00 | 0·00 | 0·00 | ... | 151·2 | 4·1 | 3·3 | 201 | 42·10 | 26·14 |

Long. 76° 42′ W. Height above Sea 3,800 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 60·3 | ·525 | 5·7 | 1·7 | 78·0 | 460·1 | 3·75 | 12·00 | 1·50 | 5·75 | 8·00 | ... | ... | 2·4 | 5·3 | 15 | 7·23 | 3·86 |
| 59·9 | ·517 | 5·7 | 1·5 | 80·0 | 461·1 | 3·75 | 7·75 | 1·25 | 0·75 | 14·50 | ... | ... | 1·5 | 4·6 | 21 | 4·05 | 1·25 |
| 60·9 | ·535 | 5·8 | 1·6 | 79·5 | 460·1 | 3·00 | 8·50 | 0·00 | 1·00 | 18·50 | ... | ... | 0·9 | 5·4 | 12 | 2·45 | 0·55 |
| 61·5 | ·547 | 5·9 | 1·8 | 78·0 | 459·0 | 2·00 | 5·50 | 0·00 | 0·00 | 22·50 | ... | ... | 0·4 | 5·7 | 13 | 9·81 | 5·42 |
| 62·3 | ·561 | 6·2 | 1·8 | 76·5 | ... | 4·75 | 9·00 | 0·00 | 0·75 | 16·50 | ... | ... | 0·7 | 6·2 | 13 | 11·89 | 1·60 |
| 62·3 | ·563 | 6·1 | 2·5 | 70·8 | ... | 4 00 | 5·25 | 1·00 | 2·75 | 17·00 | ... | ... | 11·5 | 5·2 | 13 | 4·29 | 1·20 |
| 63·3 | ·584 | 6·3 | 2·4 | 73·1 | 457·0 | 4·50 | 11·00 | 1·50 | 1·50 | 12·50 | ... | ... | 0·8 | 5·2 | 14 | 5·41 | 0·97 |
| 68·2 | ·690 | 7·5 | 1·3 | 85·5 | 455·8 | 4·75 | 6·25 | 0·75 | 2·25 | 17·00 | ... | ... | 1·1 | 5·8 | 16 | 9·44 | 3·99 |
| 67·4 | ·671 | 7·3 | 1·8 | 80·5 | 454·7 | 4·50 | 10·00 | 0·00 | 0·00 | 15·50 | ... | ... | 1·1 | 5·4 | 17 | 15·65 | 10·30 |
| 63·2 | ·576 | 6·4 | 1·4 | 81·5 | 457·2 | 7·00 | 14·25 | 1·75 | 0·50 | 7·50 | ... | ... | 4·1 | 5·7 | 29 | 28·52 | 16·17 |
| 62·9 | ·576 | 6·3 | 1·2 | 84·0 | ... | 6·50 | 10 75 | 0·25 | 0·50 | 12·00 | ... | ... | 3·2 | 5·3 | 22 | 29·10 | 26·81 |
| 61·7 | ·551 | 6·0 | 1·5 | 80·5 | ... | 7·25 | 8·25 | 0·00 | 0·50 | 15·00 | ... | ... | 2·1 | 6·0 | 15 | 10·8 | 10·2 |
| 62·8 | ·575 | 6·2 | 1·7 | 79·8 | ... | 55·75 | 108·50 | 8·00 | 16·25 | 176·00 | ... | ... | 2·5 | 5·5 | 200 | 135·92 | 82·32 |

* 7 days short. † 8 days short. ‡ 6 days short. § 3 days short.
‖ 2½ days short. Out of order. ¶ 8½ days short.

UP PARK CAMP, JAMAICA. Lat. 19° 59′ N.

| Month. | Readings of the Barometer. | | | Temperature of the Air. | | | | | | | Mean Daily Readings of | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean reduced and corrected to 32°. | Highest reduced and corrected to 32°. | Lowest reduced and corrected to 32°. | Highest during Month. | Lowest during Month. | Range during Month. | Mean. Of all the highest. | Mean. Of all the lowest. | Mean. Daily Range. | Mean. Approximate Temperature. | Maximum in Sun's rays. | Minimum on grass. | Hygrometer. Dry Bulb. | Hygrometer. Wet Bulb. |
| January ... ... | 29·778 | 29·877 | 29·674 | 100·0 | 60·0 | 40·0 | 97·0 | 63·3 | 33·7 | 80·1 | 139·3 | 59·2 | 82·6 | 72·1 |
| February ... ... | 29·739 | 29·877 | 29·649 | 100·5 | 59·5 | 41·0 | 96·9 | 62·8 | 34·1 | 79·8 | 139·9 | 59·6 | 81·1 | 71·3 |
| March ... ... ... | 29·744 | 29·852 | 29·679 | 100·0 | 60·5 | 39·5 | 95·6 | 63·5 | 32·1 | 79·5 | 137·1 | 60·5 | 82·7 | 72·6 |
| April ... ... ... | 29·771 | 29·873 | 29·667 | 100·5 | 61·0 | 39·5 | 98·0 | 64·3 | 33·7 | 81·1 | 138·7 | 61·2 | 84·2 | 73·5 |
| May ... ... ... | 29·738 | 29·875 | 29·662 | 102·0 | 61·0 | 41·0 | 96·2 | 65·9 | 30·3 | 81·0 | 129·3 | 63·6 | 83·0 | 74·3 |
| June ... ... ... | 29·745 | 29·871 | 29·688 | 103·0 | 63·0 | 40·0 | 98·0 | 65·8 | 32·2 | 81·9 | 138·1 | 63·0 | 84·8 | 75·0 |
| July ... ... ... | 29·758 | 29·870 | 29·675 | 102·0 | 63·5 | 38·5 | 98·3 | 66·6 | 31·7 | 82·4 | 137·7 | 64·0 | 85·0 | 75·6 |
| August ... ... ... | 29·716 | 29·832 | 29·586 | 102·0 | 64·0 | 38·0 | 99·2 | 67·0 | 32·2 | 83·1 | 137·9 | 65·0 | 85·3 | 76·8 |
| September ... ... | 29·705 | 29·775 | 29·610 | 103·0 | 65·5 | 37·5 | 98·8 | 68·2 | 30·6 | 83·5 | 140·5 | 66·0 | 86·5 | 74·3 |
| October... ... ... | 29·647 | 29·742 | 29·442 | 99·0 | 62·0 | 37·0 | 94·1 | 66·7 | 27·4 | 80·4 | 133·5 | 64·7 | 81·0 | 75·0 |
| November ... ... | 29·674 | 29·927 | 28·890 | 102·5 | 62·5 | 40 0 | 94·8 | 65·3 | 29·5 | 80·0 | 134·0 | 63·0 | 81·7 | 75·0 |
| December ... ... | * | * | * | 103·0 | 58·0 | 45·0 | 97·3 | 63·3 | 34·0 | 80·3 | 136·0 | 60·9 | 83·0 | 74·4 |
| Sums, Means, and Totals ... | 29·929 | 29·852 | 29·566 | 101·4 | 61·7 | 39·7. | 97·0 | 65·2 | 31·8 | 81·1 | 136·8 | 62·5 | 83·4 | 74·1 |

BERMUDA. Lat. 32° 27′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January† ... ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| February† ... ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| March ... ... ... | 29·861 | 30·189 | 29·338 | 74·0 | 39·5 | 34·5 | 67·7 | 48·6 | 19·1 | 58·1 | 125·0 | 46·4 | 62·6 | 56·7 |
| April ... ... ... | 29·871 | 30·243 | 29·610 | 80·5 | 47·8 | 32·7 | 74·6 | 53·9 | 20·7 | 64·2 | 131·5 | 51·1 | 70·3 | 63·1 |
| May ... ... .. | 29·949 | 30·205 | 29·712 | 85·8 | 57·0 | 28·8 | 79·3 | 62·0 | 17·3 | 70·6 | 130·1 | 60·4 | 74·6 | 70·3 |
| June ... ... ... | 29·990 | 30·137 | 29·872 | 90·5 | 61·0 | 29·5 | 86·3 | 70·9 | 15·4 | 78·6 | 142·2 | 64·2 | 81·4 | 75·5 |
| July ... ... ... | 30·064 | 30·155 | 29·914 | 98·2 | 71·0 | 27·2 | 91·9 | 74·6 | 17·3 | 83·2 | 149·1 | 67·3 | 87·0 | 78·6 |
| August ... ... ... | 29·942 | 30·173 | 29·767 | 98·2 | 70·5 | 27·7 | 90·9 | 73·7 | 17·2 | 82·3 | 146·9 | 66·4 | 85·6 | 76·7 |
| September ... ... | 29·893 | 30·133 | 29·107 | 97·2 | 66·5 | 30·7 | 84·8 | 71·3 | 13·5 | 78·0 | 135·9 | 65·1 | 80·0 | 73·6 |
| October... ... ... | 29·930 | 30·190 | 29·463 | 89·5 | 60·5 | 29·0 | 82·1 | 68·6 | 13·5 | 75·3 | 131·2 | 60·9 | 77·7 | 71·1 |
| November ... ... | 29·920 | 30·200 | 29·579 | 80·0 | 51·0 | 29·0 | 75·2 | 62·3 | 12·9 | 68·7 | 109·7 | 53·9 | 70·4 | 64·0 |
| December ... ... | 29·888 | 30·341 | 29·416 | 76·5 | 46·8 | 29·7 | 70 0 | 57·8 | 12·2 | 63·9 | 100·7 | 48·5 | 65·7 | 59·8 |
| Sums, Means, and Totals ... | 29·935 | 30·195 | 29·559 | 87·7 | 58·1 | 29·6 | 80·9 | 65·2 | 15·7 | 73·0 | 130·5 | 58·0 | 76·2 | 69·6 |

* Instrument defective.

† Observations suspended during January and February, owing to removal of instruments from St. George's to Prospect Hill.

No. XXIII—*continued.*

Long. 76° 56′ W. Height above Sea 225 feet.

| Hygrometrical Results from Glaisher's Tables (3rd edition). | | | | | | Atmospherical Conditions. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | In a Cubic Foot of Air. | | | | Number of Days for mean Direction of Wind. | | | | | Calculated from Robinson's Anemometer. | | | | | Amount of Rain fall. | |
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean Degree of Humidity. | Mean Weight of Cubic Foot of Air. | North. | East. | South. | West. | Number of calm, or nearly calm, Days. | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of Days on which Rain fell. | On the Ground. | 30 Feet above the Ground. |
| | | | | | | | | | | | lbs. per sq. foot. | Miles | | | | Inches | Inches |
| 65·1 | ·619 | 6·6 | 5·3 | 55·5 | 506·2 | 9·25 | 18·00 | 2·50 | 1·25 | 0·00 | ... | 60·7 | 2·7 | 4·8 | 4 | 2·57 | 2·23 |
| 64·6 | ·610 | 6·5 | 4·8 | 56·9 | 496·7 | 9·00 | 16·25 | 1·25 | 1·50 | 0·00 | ... | 75·6 | 3·2 | 4·9 | 3 | 1·20 | 0·85 |
| 65·9 | ·637 | 6·8 | 5·1 | 56·7 | 505·5 | 4·75 | 22·00 | 3·50 | 0·75 | 0·00 | ... | 89·0 | 2·9 | 5·3 | 4 | 1·00 | 0·77 |
| 66·4 | ·650 | 6·9 | 5·6 | 54·9 | 504·5 | 5·25 | 20·50 | 4·25 | 0·00 | 0·00 | ... | 69·6 | 3·1 | 5·3 | 4 | 0·95 | 0·69 |
| 68·5 | ·696 | 7·4 | 4·6 | 62·0 | 504·7 | 5·75 | 20·75 | 3·75 | 0·75 | 0·00 | ... | 108·4 | 3·8 | 5·3 | 9 | 9·62 | 6·99 |
| 68·6 | ·700 | 7·4 | 5·3 | 57·6 | 503·2 | 9·00 | 19·25 | 1·00 | 0·75 | 0·00 | ... | 79·6 | 2·8 | 5·8 | 6 | 2·01 | ... |
| 69·5 | ·722 | 7·6 | 5·2 | 59·8 | 503·1 | 9·75 | 19·75 | 1·00 | 0·50 | 0·00 | ... | 67·4 | 2·9 | 5·1 | 3 | 2·30 | ... |
| 71·3 | ·767 | 8·1 | 4·8 | 62·5 | 501·9 | 8·50 | 20·50 | 1·50 | 0·50 | 0·00 | ... | 56·4 | 3·0 | 4·8 | 5 | 3·70 | ... |
| 66·4 | ·648 | 6·8 | 6·6 | 51·9 | 501·4 | 5·75 | 21·50 | 2·75 | 0·00 | 0·00 | ... | 54·1 | 3·3 | 5·0 | 8 | 3·66 | ... |
| 70·8 | ·755 | 8·1 | 3·3 | 71·6 | 504·6 | 4·25 | 24·25 | 1·75 | 0·75 | 0·00 | ... | 40·9 | 5·5 | 4·7 | 23 | 18·64 | ... |
| 70·5 | ·746 | 8·0 | 3·6 | 69·2 | 504·5 | 8·50 | 20·00 | 0·50 | 1·00 | 0·00 | ... | 25·6 | 4·8 | 4·2 | 12 | 10·02 | ... |
| 68·7 | ·700 | 7·5 | 4·5 | 61·6 | ... | 9·00 | 20·00 | 1·00 | 1·00 | 0·00 | ... | 38·8 | 3·1 | 4·3 | 2 | 3·55 | ... |
| 67·9 | ·687 | 7·3 | 4·9 | 60·0 | ... | 88·75 | 242·75 | 24·75 | 8·75 | 0·00 | ... | 56·3 | 3·4 | 5·0 | 83 | 59·22 | ... |

Long. 64° 40′ E. Height above Sea 61 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 51·6 | ·384 | 4·2 | 2·1 | 68·1 | 528·7 | 4·50 | 0·50 | 2·00 | 8·00 | 0·00 | ... | 137·0 | 7·4 | 4·7 | 5 | 2·09 | 1·14 |
| 57·6 | ·475 | 5·2 | 2·9 | 64·2 | 520·5 | 7·50* | 4·00* | 8·50* | 9·00* | 0·00* | ... | 162·4 | 5·6 | 4·2 | 10 | 2·79 | 2·50 |
| 67·2 | ·667 | 7·2 | 2·1 | 77·5 | 516·5 | 4·50 | 5·50 | 11·00 | 10·00 | 0·00 | ... | 142·1 | 8·0 | 4·1 | 8 | 4·87 | 2·56 |
| 71·5 | ·773 | 8·3 | 3·3 | 72·4 | 510·0 | 1·50 | 1·50 | 9·50 | 13·50 | 4·00 | ... | 226·5 | 6·6 | 3·5 | 15 | 3·43 | 3·18 |
| 73·2 | ·820 | 8·6 | 5·0 | 63·4 | 505·9 | 2·00 | 1·00 | 11·50 | 12·50 | 4·00 | ... | 86·4 | 4·9 | 3·0 | 7 | 2·84 | 2·29 |
| 70·9 | ·758 | 8·0 | 5·0 | 61·3 | 505·5 | 6·50 | 5·50 | 5·50 | 8·50 | 5·00 | ... | 103·2 | 5·0 | 3·2 | 7 | 1·62 | 1·34 |
| 69·2 | ·715 | 7·6 | 3·4 | 69·4 | 510·1 | 3·00 | 10·50 | 9·50 | 6·00 | 1·00 | ... | 186·8 | 7·0 | 3·3 | 11 | 5·90 | 5·11 |
| 66·5 | ·651 | 7·0 | 3·2 | 68·6 | 513·3 | 6·00 | 8·50 | 9·50 | 7·00 | 0·00 | ... | 202·4 | 5·4 | 3·7 | 6 | 1·47 | 1·11 |
| 59·1 | ·502 | 5·4 | 2·7 | 67·4 | 521·2 | 14·00 | 4·50 | 5·00 | 6·50 | 0·00 | ... | 188·2 | 6·1 | 3·6 | 9 | 3·71 | 3·18 |
| 55·0 | ·433 | 4·8 | 2·2 | 69·2 | 525·6 | 10·00 | 1·50 | 5·50 | 12·00 | 2·00 | ... | 168·9 | 6·6 | 3·7 | 11 | 5·83 | 5·01 |
| 65·0 | ·630 | 6·8 | 3·2 | 68·1 | 520·0 | 59·50 | 43·00 | 77·50 | 93·00 | 16·00 | ... | 161·6 | 6·0 | 3·7 | 89 | 34·60 | 2·74 |

* One day short.

Appendix

Abstract of Results of Meteorological Observations

| Stations, with their Height above the Sea. | Readings of the Barometer. | | | Temperature of the Air. | | | | | | | Mean Daily Readings of | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean reduced and corrected to 32°. | Highest reduced and corrected to 32°. | Lowest reduced and corrected to 32°. | Highest during Year. | Lowest during Year. | Range during Year. | Mean | | | | Maximum in Sun's rays. | Minimum on Grass. | Hygrometer. | |
| | | | | | | | Of all the highest. | Of all the lowest. | Daily Range. | Approximate Temperature. | | | Dry Bulb. | Wet Bulb. |
| Halifax, N.S. ... 125 ft. | 29·698 | 30·528 | 28·579 | 92·3 | 3·0 | 95·3 | 55·3 | 34·1 | 21·2 | 44·7 | 91·0 | ... | 47·4 | 44·1 |
| Barbados* ... ... 25 ,, | 30·003 | 30·728 | 28·893 | 92·5 | 67·0 | 25·5 | 87·3 | 71·8 | 15·5 | 79·5 | 135·7 | ... | 83·3 | 75·4 |
| Newcastle, Jamaica 3,800 ,, | ... | ... | ... | 90·0 | 46·0 | 44·0 | 77·9 | 55·0 | 22·9 | 66·5 | ... | 52·4 | 69·7 | 65·8 |
| Up Park Camp, Jamaica ... 225 ,, | 29·929 | 29·927 | 29·442 | 103·0 | 58·0 | 45·0 | 97·0 | 65·2 | 31·8 | 81·1 | 136·8 | 62·5 | 83·4 | 74·1 |
| Bermuda† ... ... ... ... | 29·935 | 30·341 | 29·107 | 98·2 | 39·5 | 58·7 | 80·9 | 65·2 | 15·7 | 73·0 | 130·0 | 58·0 | 76·2 | 69·6 |

* Barometer for 9 months only.

† For 10 months only

No. XXIII—*continued.*

taken at Stations in North America and the West Indies, in the Year 1870

| Hygrometrical Results from Glaisher's Tables (3rd edition). | | | | | | Atmospherical Conditions. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | In a Cubic Foot of Air. | | | | Number of Days for mean Direction of Wind. | | | | | Calculated from Robinson's Anemometer. | | | | | | | |
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean Degree of Humidity. | Mean Weight of Cubic Foot of Air. | North. | East. | South. | West. | Number of calm, or nearly calm, Days. | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of Days on which Rain fell. | Rain fall on the Ground. | Latitude. | Longitude. |
| | | | | | | | | | | | lbs. per sq. foot | Miles | | | | Inches | ° ′ | ° ′ |
| 40·1 | ·274 | 2·9 | 1·2 | 75·3 | 543·3 | ... | ... | ... | ... | ... | ... | ... | 5·7 | 2·9 | 127 | 61·10 | 44 39 N. | 63 36 W. |
| 70·2 | ·741 | 7·9 | 4·3 | 64·6 | ... | 151·50 | 195·50 | 18·00 | 0·00 | 0·00 | . | 151·2 | 4·1 | 3·3 | 201 | 42·10 | 13 40 „ | 59 40 „ |
| 62·8 | ·575 | 6·2 | 1·7 | 79·8 | ... | 55·75 | 108·50 | 8·00 | 16·25 | 176·00 | ... | ... | 2·5 | 5·5 | 200 | 135·92 | 18 60 „ | 76 42 „ |
| 67·9 | ·687 | 7·3 | 4·9 | 60·0 | ... | 87·75 | 242·75 | 24·75 | 8·75 | 0·00 | ... | 56·3 | 3·4 | 5·0 | 83 | 59·22 | 17 59 „ | 76 56 „ |
| 65·0 | ·630 | 6·8 | 3·2 | 68·1 | 520·0 | 59·50 | 43·00 | 77·50 | 93·00 | 16·00 | .. | 161·6 | 6·0 | 3·7 | 89 | 34·60 | 32 22 „ | 64 40 „ |

Appendix

## Abstract of Results of Meteorological Observations

### COLOMBO, CEYLON. Lat. 6° 56′ N.

| Month. | Readings of the Barometer. | | | Temperature of the Air. | | | | | | | Mean Daily Readings of | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean reduced and corrected to 32°. | Highest reduced and corrected to 32°. | Lowest reduced and corrected to 32°. | Highest during Month. | Lowest during Month. | Range during Month. | Mean | | | | Maximum in Sun's rays. | Minimum on Grass. | Hygrometer. | |
| | | | | | | | Of all the highest. | Of all the lowest. | Daily Range. | Approximate Temperature. | | | Dry Bulb. | Wet Bulb. |
| January* ... ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| February* ... ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| March*... ... ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| April ... ... ... | 29·802 | 29·893 | 29·665 | 97·0 | 69·0 | 28·0 | 94·1 | 72·3 | 21·8 | 83·2 | ... | ... | 85·2 | 79·7 |
| May ... ... ... | 29·847 | 29·901 | 29·798 | 96·0 | 67·0 | 29·0 | 94·2 | 72·1 | 22·1 | 83·1 | ... | ... | 85·0 | 80·5 |
| June ... ... ... | 29·827 | 29·886 | 29·782 | 95·5 | 69·0 | 26·5 | 91·9 | 72·8 | 19·1 | 82·3 | ... | ... | 84·0 | 79·7 |
| July ... ... ... | 29·842 | 29·904 | 29·804 | 92·5 | 66·0 | 26·5 | 89·5 | 70·8 | 18·7 | 80·1 | ... | ... | 83·6 | 79·5 |
| August... ... ... | 29·851 | 29·896 | 29·814 | 90·7 | 68·0 | 22·7 | 88·7 | 73·4 | 15·3 | 81·0 | ... | ... | 82·2 | 76·3 |
| September ... ... | 29·849 | 29·906 | 29·804 | 89·0 | 68·3 | 21·7 | 86·1 | 71·8 | 14·3 | 78·9 | ... | ... | 82·1 | 79·2 |
| October ... ... | 29·859 | 29·924 | 29·786 | 87·2 | 67·4 | 19·8 | 84·7 | ... | ... | ... | ... | ... | 81·8 | 78·8 |
| November ... ... | 29·884 | 29·989 | 29·811 | 93·8 | 70·0 | 23·8 | 89·8 | 72·0 | 17·8 | 80·9 | ... | ... | 82·9 | 78·1 |
| December ... ... | 29·882 | 30·009 | 29·746 | 93·4 | 64·0 | 29·4 | 90·0 | 68·2 | 21·8 | 79·1 | ... | ... | 81·9 | 75·5 |
| Sums, Means, and Totals ... | 29·849 | 29·923 | 29·779 | 92·8 | 67·6 | 25·2 | ... | ... | ... | ... | ... | ... | 83·2 | 78·6 |

### KANDI, CEYLON. Lat. 7° 18′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | ... | ... | ... | 96·0 | 54·0 | 42·0 | 88·0 | 61·1 | 26·9 | 74·5 | ... | ... | 77·4 | 71·6 |
| February ... ... | ... | ... | ... | 99·0 | 55·0 | 44·0 | 94·7 | 60·5 | 34·2 | 77·6 | ... | ... | 81·9 | 72·6 |
| March ... ... ... | ... | ... | ... | 101·0 | 58·5 | 42·5 | 96·9 | 63·7 | 33·2 | 80·3 | ... | ... | 84·9 | 74·4 |
| April ... ... ... | ... | ... | ... | 104·0 | 60·0 | 44·0 | 98·4 | 63·6 | 34·8 | 81·0 | ... | ... | 86·3 | 75·6 |
| May ... ... ... | ... | ... | ... | 105·0 | 62·0 | 43·0 | 97·0 | 66·8 | 30·2 | 81·9 | ... | ... | 85·7 | 76·0 |
| June ... ... ... | ... | ... | ... | 102·5 | 61·5 | 41·0 | 90·6 | 64·7 | 25·9 | 77·6 | ... | ... | 80·[illegible] | 74·3 |
| July ... ... ... | ... | ... | ... | 102·0 | 62·5 | 39·5 | 90·0 | 65·4 | 24·6 | 77·7 | ... | ... | 7[illegible]·4 | 73·3 |
| August ... ... ... | ... | ... | ... | 101·0 | 62·0 | 39·0 | 91·6 | 64·5 | 27·1 | 78·0 | ... | ... | 78·5 | 73·4 |
| September ... ... | ... | ... | ... | 100·6 | 62·4 | 38·2 | 97·0 | 65·0 | 32·0 | 81·0 | ... | ... | 82·8 | 74·8 |
| October ... ... | ... | ... | ... | 96·0 | 57·5 | 38·5 | 88·4 | 62·7 | 25·7 | 75·5 | ... | ... | 80·2 | 73·6 |
| November ... ... | ... | ... | ... | 97·0 | 54·0 | 43·0 | 92·9 | 60·8 | 32·1 | 76·8 | ... | ... | 81·0 | 73·4 |
| December ... ... | ... | ... | ... | 95·5 | 56·4 | 39·1 | 90·7 | 61·6 | 29·1 | 76·1 | ... | ... | 79·9 | 72·1 |
| Yearly Sums, Means, and Totals ... | ... | ... | ... | 99·9 | 58·8 | 41·1 | 93·0 | 63·4 | 29·6 | 78·2 | ... | ... | 81·4 | 73·8 |

### NEWERA ELLIA, CEYLON. Lat. 6° 48′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | ... | ... | ... | 79·0 | 26·3 | 52·7 | 72·0 | 41·1 | 30·9 | 56·5 | 129·7 | 28·6 | 64·0 | 56·9 |
| February ... ... | ... | ... | ... | 83·0 | 27·5 | 55·5 | 77·2 | 36·1 | 41·1 | 56·6 | 140·2 | 18·8 | 66·6 | 58·1 |
| March ... ... ... | ... | ... | ... | 82·8 | 29·0 | 53·8 | 79·4 | 41·6 | 37·8 | 60·5 | 141·1 | 24·1 | 67·4 | 58·5 |
| April ... ... ... | ... | ... | ... | 85·0 | 28·5 | 56·5 | 79·5 | 39·3 | 40·2 | 59·4 | 138·2 | 21·2 | 68·4 | 59·3 |
| May ... ... ... | ... | ... | ... | 85·0 | 35·5 | 49·5 | 78·2 | 46·3 | 31·9 | 62·2 | 137·7 | 30·7 | 68·5 | 61·6 |
| June ... ... ... | ... | ... | ... | 79·0 | 41·0 | 38·0 | 72·4 | 48·8 | 23·6 | 60·6 | 124·0 | 34·4 | 63·9 | 59·5 |
| July ... ... ... | ... | ... | ... | 75·5 | 41·0 | 34·5 | 68·2 | 48·6 | 19·6 | 58·4 | 116·1 | 33·9 | 61·4 | 57·5 |
| August... ... ... | ... | ... | ... | 79·0 | 39·0 | 40·0 | 69·7 | 47·0 | 22·7 | 58·3 | 126·6 | 36·8 | 62·0 | 58·2 |
| September ... ... | ... | ... | ... | 79·0 | 33·0 | 46·0 | 70·3 | 46·7 | 23·6 | 58·5 | 125·2 | 36·5 | 62·2 | 58·4 |
| October ... ... | ... | ... | ... | 78·0 | 35·0 | 43·0 | 72·0 | 44·9 | 27·1 | 58·4 | 129·9 | 37·1 | 62·5 | 58·9 |
| November ... ... | ... | ... | ... | 82·0 | 23·0 | 59·0 | 77·9 | 37·0 | 40·9 | 57·4 | 142·5 | 17·1 | 65·2 | 58·2 |
| December ... ... | ... | ... | ... | 83·0 | 19·0 | 64·0 | 75·2 | 38·2 | 37·0 | 56·7 | 135·6 | 25·0 | 64·4 | 58·4 |
| Yearly Sums, Means, and Totals ... | ... | ... | ... | 80·9 | 31·5 | 49·4 | 74·3 | 43·0 | 31·3 | 58·6 | 132·2 | 28·7 | 64·7 | 58·6 |

* First three months incomplete, owing to the defective state of the instruments.

No. XXIII—*continued.*

taken at Stations in the Island of Ceylon, in the Year 1870.

Long. 79° 49′ E. Height above Sea 18 feet.

| Hygrometrical Results from Glashier's Tables (3rd edition). | | | | | | Atmospherical Conditions. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | In a Cubic Foot of Air. | | | | Number of Days for mean Direction of Wind. | | | | | Calculated from Robinson's Anemometer. | | | | | Amount of Rain fall. | |
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean degree of Humidity. | Mean Weight of Cubic Foot of Air. | North. | East. | South. | West. | Number of calm, or nearly calm, Days. | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of days on which Rain fell. | On the Ground. | 18 Feet above the Ground. |
| | | | | | | | | | | | lbs. per sq. foot | Miles. | | | | Inches | Inches |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 76·1 | ·904 | 9·5 | 3·4 | 74·0 | 502·6 | ... | ... | ... | ... | ... | ... | ... | 2·7 | 1·2 | 9 | 6·78 | ... |
| 77·5 | ·947 | 10·0 | 2·8 | 78·0 | 503·2 | ... | ... | ... | ... | ... | ... | ... | 2·9 | 1·1 | 14 | 4·81 | ... |
| 76·9 | ·923 | 9·8 | 2·6 | 78·8 | 503·9 | ... | ... | ... | ... | ... | ... | ... | 3·1 | 1·0 | 13 | 3·18 | ... |
| 76·8 | ·920 | 9·8 | 2·4 | 80·1 | 504·6 | ... | ... | ... | ... | ... | ... | ... | 4·5 | 1·0 | 8 | 2·21 | ... |
| 72·4 | ·795 | 8·5 | 3·2 | 72·4 | 506·9 | ... | ... | ... | ... | ... | ... | ... | 6·2 | 1·0 | 8 | 4·92 | ... |
| 77·3 | ·934 | 10·0 | 1·7 | 85·5 | 506·0 | ... | ... | ... | ... | ... | ... | ... | 4·3 | 1·0 | 1 | 0·75 | ... |
| 76·8 | ·921 | 9·8 | 1·8 | 85·8 | 506·5 | ... | ... | ... | ... | ... | ... | ... | 6·9 | 1·0 | 2 | ... | ... |
| 74·9 | ·863 | 9·2 | 2·8 | 76·9 | 506·3 | ... | ... | ... | ... | ... | ... | ... | 2·9 | 1·0 | 13 | 7·34 | ... |
| 71·2 | ·765 | 8·2 | 3·5 | 80·4 | 507·8 | ... | ... | ... | ... | ... | ... | ... | 6·9 | 6·2 | 11 | 5·16 | ... |
| 75·5 | ·886 | 9·4 | 2·7 | 79·1 | 505·3 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |

Long. 80° 48′ E. Height above Sea 1·678 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 67·5 | ·679 | 7·3 | 2·9 | 71·8 | ... | 11·25 | 11·75 | 0·50 | 7·50 | 0·00 | ... | ... | 6·1 | 5·4 | 10 | 9·57 | ... |
| 66·4 | ·648 | 6·9 | 4·7 | 59·7 | ... | 12·00 | 12·00 | 0·00 | 0·00 | 4·00 | ... | ... | 3·8 | 5·0 | 7 | 4·58 | ... |
| 67·5 | ·677 | 7·2 | 5·6 | 55·5 | ... | 10·50 | 10·75 | 0·25 | 0·00 | 9·50 | ... | ... | 2·0 | 4·7 | 8 | 2·75 | ... |
| 68·7 | ·701 | 7·4 | 5·9 | 55·9 | ... | 9·25 | 9·25 | 3·25 | 3·25 | 5·00 | ... | ... | 3·2 | 4·1 | 6 | 2·70 | ... |
| 69·7 | ·726 | 7·7 | 5·4 | 58·9 | ... | 0·00 | 0·00 | 13·75 | 14·75 | 2·50 | ... | ... | 4·6 | 5·8 | 3 | 1·15 | ... |
| 70·0 | ·735 | 7·8 | 3·3 | 69·8 | ... | 0·00 | 0·00 | 12·75 | 12·75 | 4·50 | ... | ... | 5·8 | 6·7 | 13 | 5·49 | ... |
| 69·[illegible] | ·729 | 7·8 | 2·6 | 74·6 | ... | 0·00 | 0·00 | 15·25 | 15·25 | 0·50 | ... | ... | 7·5 | 6·3 | 11 | 2·50 | ... |
| 69·9 | ·732 | 7·9 | 2·6 | 74·6 | ... | 0·00 | 0·00 | 10·75 | 10·75 | 9·50 | ... | ... | 6·6 | 7·0 | 17 | 7·46 | ... |
| 69·5 | ·720 | 7·7 | 4·3 | 64·8 | ... | 0·00 | 0·00 | 12·75 | 12·75 | 4·50 | ... | ... | 4·2 | 3·0 | 10 | 4·41 | ... |
| 69·1 | ·712 | 7·6 | 3·5 | 68·5 | ... | 0·00 | 0·00 | 12·75 | 12·75 | 5·50 | ... | ... | 5·6 | 3·3 | 14 | 10·38 | ... |
| 66·9 | ·660 | 7·0 | 4·9 | 57·9 | ... | 6·00 | 6·00 | 6·25 | 6·25 | 5·50 | ... | ... | 2·8 | 3·9 | 10 | 6·10 | ... |
| 66·7 | ·665 | 7·1 | 3·9 | 63·8 | ... | 14·25 | 14·25 | 0·00 | 0·00 | 2·50 | ... | ... | 4·0 | 6·2 | 7 | 2·85 | ... |
| 68·5 | ·699 | 7·6 | 4·1 | 64·6 | ... | 63·25 | 64·00 | 88·25 | 96·00 | 53·50 | ... | ... | 4·7 | 5·1 | 116 | 59·64 | ... |

Long. 80° 48′ E. Height above Sea 6,200 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51·0 | ·373 | 4·2 | 2·4 | 62·6 | ... | 2·50 | 9·25 | 15·00 | 4·25 | 0·00 | ... | ... | 2·6 | 5·7 | 16 | 17·88 | ... |
| 51·3 | ·377 | 4·2 | 3·0 | 58·6 | ... | 2·75 | 11·00 | 11·75 | 2·50 | 0·00 | ... | ... | 1·6 | 5·0 | 6 | 1·76 | ... |
| 51·4 | ·380 | 4·2 | 3·2 | 56·4 | ... | 12·50 | 13·25 | 3·00 | 2·25 | 0·00 | ... | ... | 3·3 | 5·6 | 10 | 2·56 | ... |
| 52·2 | ·392 | 4·2 | 3·4 | 55·6 | ... | 15·00 | 12·00 | 0·00 | 3·00 | 0·00 | ... | ... | 3·3 | 3·3 | 10 | 5·48 | ... |
| 56·4 | ·458 | 5·0 | 2·5 | 66·0 | ... | 6·75 | 3·50 | 8·75 | 12·00 | 0·00 | ... | ... | 3·0 | 6·5 | 15 | 2·69 | ... |
| 55·8 | ·448 | 5·0 | 1·6 | 75·9 | ... | 0·75 | 0·25 | 12·00 | 17·00 | 0·00 | .. | .. | 6·3 | 7·1 | 24 | 10·19 | ... |
| 54·1 | ·420 | 4·7 | 1·4 | 77·5 | ... | 0·00 | 0·00 | 15·50 | 15·50 | 0·00 | ... | ... | 5·4 | 7·1 | 21 | 4·98 | ... |
| 55·0 | ·433 | 4·8 | 1·4 | 78·0 | ... | 0·00 | 0·25 | 15·25 | 15·50 | 0·00 | ... | ... | 4·8 | 7·0 | 21 | 5·48 | ... |
| 52·2 | ·436 | 4·8 | 1·4 | 78·0 | ... | 1·25 | 1·00 | 11·75 | 16·00 | 0·00 | ... | ... | 6·8 | 7·2 | 24 | 10·53 | ... |
| 55·8 | ·447 | 5·0 | 1·3 | 79·0 | ... | 0·75 | 2·50 | 9·75 | 18·00 | 0·00 | .. | .. | 6·6 | 7·5 | 30 | 11·00 | ... |
| 52·5 | ·394 | 4·3 | 2·5 | 63·2 | ... | 11·00 | 11·25 | 2·50 | 5·25 | 0·00 | ... | ... | 5·3 | 7·3 | 15 | 6·11 | ... |
| 53·4 | ·409 | 4·5 | 2·1 | 67·4 | ... | 14·25 | 15·75 | 0·75 | 0·25 | 0·00 | ... | ... | 5·7 | 7·2 | 14 | 5·00 | ... |
| 53·4 | ·414 | 4·6 | 2·3 | 69·8 | ... | 67·50 | 80·00 | 106·00 | 111·50 | 0·00 | ... | ... | 4·5 | 6·4 | 206 | 73·66 | ... |

Appendix

TRINCOMALEE. Lat. 8° 30′ N.

| Month. | Readings of the Barometer. | | | Temperature of the Air. | | | | | | | Mean Daily Readings of | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean reduced and corrected to 32°. | Highest reduced and corrected to 32°. | Lowest reduced and corrected to 32°. | Highest during Month. | Lowest during Month. | Range during Month. | Mean | | | | Maximum in Sun's rays. | Minimum on Grass. | Hygrometer. | |
| | | | | | | | Of all the highest. | Of all the lowest. | Daily Range. | Approximate Temperature. | | | Dry Bulb. | Wet Bulb. |
| January ... ... | ... | ... | ... | 93·8 | 60·4 | 33·4 | 86·8 | 69·3 | 17·5 | 78·0 | ... | ... | 80·5 | 76·1 |
| February ... ... | ... | ... | ... | 95·0 | 64·8 | 30·2 | 89·3 | 69·7 | 19·6 | 79·5 | ... | ... | 83·0 | 76·8 |
| March ... ... ... | ... | ... | ... | 97·4 | 69·0 | 28·4 | 93·0 | 72·4 | 20·6 | 82·7 | ... | ... | 86·3 | 79·6 |
| April ... ... ... | ... | ... | ... | 104·2 | 70·0 | 34·2 | 97·7 | 73·1 | 24·6 | 85·4 | ... | ... | 89·8 | 80·9 |
| May ... ... ... | ... | ... | ... | 105·8 | 70·2 | 35·6 | 101·4 | 74·5 | 26·9 | 87·9 | ... | ... | 92·5 | 80·9 |
| June ... ... ... | ... | ... | ... | 106·0 | 68·4 | 37·6 | 98·6 | 72·5 | 26·1 | 85·5 | ... | ... | 89·9 | 80·3 |
| July ... ... ... | ... | ... | ... | 101·0 | 64·2 | 36·8 | 96·4 | 71·7 | 24·7 | 84·0 | ... | ... | 87·5 | 79·1 |
| August ... ... ... | ... | ... | ... | 101·4 | 68·6 | 32·8 | 95·9 | 71·0 | 24·9 | 83·4 | ... | ... | 87·2 | 79·1 |
| September ... ... | ... | ... | ... | 102·0 | 67·4 | 34·6 | 95·8 | 71·4 | 24·4 | 83·6 | ... | ... | 87·4 | 78·1 |
| October ... ... ... | ... | ... | ... | 101·6 | 68·0 | 33·6 | 95·5 | 70·2 | 25·3 | 82·8 | ... | ... | 86·7 | 78·8 |
| November ... ... | ... | ... | ... | 99·0 | 65·2 | 33·8 | 92·7 | 69·8 | 22·9 | 81·2 | ... | ... | 85·6 | 78·3 |
| December ... ... | ... | ... | ... | 91·4 | 66·0 | 25·4 | 89·0 | 70·3 | 18·7 | 79·6 | ... | ... | 82·1 | 76·5 |
| Yearly Sums, Means, and Totals ... | ... | ... | ... | 99·8 | 66·8 | 33·0 | 94·3 | 71·3 | 23·0 | 82·8 | ... | ... | 86·5 | 78·7 |

Abstract of Results of Meteorological Observations

| Stations, with their Height above the Sea. | Readings of the Barometer. | | | Temperature of the Air. | | | | | | | Mean Daily Readings of | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean reduced and corrected to 32°. | Highest reduced and corrected to 32°. | Lowest reduced and corrected to 32°. | Highest during Year. | Lowest during Year. | Range during Year. | Mean | | | | Maximum in Sun's rays. | Minimum on Grass. | Hygrometer. | |
| | | | | | | | Of all the highest. | Of all the lowest. | Daily Range. | Approximate Temperature. | | | Dry Bulb. | Wet Bulb. |
| Colombo* ... 18 ft. | 29·802 | 30·009 | 29·665 | 97·0 | 64·0 | 33·0 | † | † | † | † | † | † | 83·2 | 78·6 |
| Kandy ... 1,678 ,, | ... | ... | ... | 105·0 | 54·0 | 51·0 | 93·0 | 63·4 | 29·6 | 78·2 | ... | ... | 81·4 | 73·8 |
| Newera Ellia 6,200 ,, | ... | ... | ... | 85·0 | 19·0 | 66·0 | 74·3 | 43·0 | 31·3 | 58·6 | 132·2 | 28·7 | 64·7 | 58·6 |
| Trincomalee 25 ,, | ... | ... | ... | 106·0 | 60·4 | 45·6 | 94·3 | 71·3 | 23·0 | 82·8 | ... | ... | 86·5 | 78·7 |

* For 9 months only, commencing April. † Too incomplete to summarize.

No. XXIII—*continued.*

Long. 82° 0′ E. Height above the Sea 25 feet.

| Hygrometrical Results from Glaisher's Tables (3rd edition). | | | | | | Atmospherical Conditions. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | In a Cubic Foot of Air. | | | | Number of Days for mean Direction of Wind. | | | | | Calculated from Robinson's Anemometer. | | | | | Amount of Rain fall. | |
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean Degree of Humidity. | Mean Weight of Cubic Foot of Air. | North. | East. | South. | West. | Number of calm, or nearly calm, Days. | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of Days on which Rain fell. | On the Ground. | Feet above the Ground. |
| | | | | | | | | | | | lbs. per sq. foot | Miles | | | | Inches | Inches |
| 73·1 | ·816 | 8·7 | 2·4 | 78·5 | ... | 14·75 | 15·25 | 0·75 | 0·25 | 0·00 | ... | ... | 6·7 | 6·0 | 18 | 11·31 | ... |
| 72·7 | ·801 | 8·5 | 3·5 | 71·2 | ... | 12·50 | 14·00 | 1·50 | 0·00 | 0·00 | ... | ... | 5·0 | 4·5 | 4 | 1·50 | ... |
| 75·3 | ·879 | 9·2 | 3·7 | 69·5 | ... | 12·00 | 15·50 | 3·50 | 0·00 | 0·00 | ... | ... | 3·8 | 3·8 | 3 | 0·72 | ... |
| 75·3 | ·879 | 9·2 | 5·5 | 62·2 | ... | 8·25 | 15·00 | 6·75 | 0·00 | 0·00 | ... | ... | 4·4 | 4·3 | 5 | 0·26 | ... |
| 73·8 | ·834 | 8·6 | 7·3 | 54·2 | ... | 7·75 | 15·50 | 7·75 | 0·00 | 0·00 | ... | ... | 4·7 | 3·5 | 4 | 0·51 | ... |
| 74·3 | ·849 | 8·9 | 5·9 | 59·5 | ... | 1·50 | 7·25 | 14·50 | 6·75 | 0·00 | ... | ... | 5·9 | 5·1 | 9 | 3·73 | ... |
| 73·8 | ·833 | 8·7 | 5·0 | 63·4 | ... | 1·00 | 9·00 | 16·75 | 4·25 | 0·00 | ... | ... | 5·5 | 5·1 | 6 | 4·12 | ... |
| 73·9 | ·833 | 8·8 | 4·9 | 64·6 | ... | 2·50 | 10·00 | 13·25 | 5·25 | 0·00 | ... | ... | 5·8 | 6·1 | 10 | 7·41 | ... |
| 72·1 | ·790 | 8·3 | 5·5 | 60·2 | ... | 0·00 | 0·50 | 15·00 | 14·50 | 0·00 | ... | ... | 4·9 | 4·4 | 8 | 5·28 | ... |
| 73·7 | ·834 | 7·8 | 4·7 | 65·1 | ... | 3·00 | 3·50 | 12·50 | 12·00 | 0·00 | ... | ... | 5·6 | 5·0 | 12 | 4·23 | ... |
| 73·5 | ·829 | 8·7 | 4·3 | 67·4 | ... | 9·50 | 10·25 | 5·25 | 5·00 | 0·00 | ... | ... | 4·6 | 4·6 | 13 | 9·25 | ... |
| 72·7 | ·806 | 8·6 | 3·1 | 73·6 | ... | 14·75 | 15·00 | 0·75 | 0·50 | 0·00 | ... | ... | 6·0 | 6·9 | 18 | 9·66 | ... |
| 73·5 | ·832 | 8·6 | 4·6 | 64·1 | ... | 87·50 | 130·75 | 98·25 | 48·50 | 0·00 | ... | ... | 5·2 | 4·8 | 110 | 57·98 | ... |

taken at Stations in the Island of Ceylon, in the Year 1870.

| Hygrometrical Results from Glaisher's Tables (3rd edition). | | | | | | Atmospherical Conditions. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | In a Cubic Foot of Air. | | | | Number of Days for mean Direction of Wind. | | | | | Calculated from Robinson's Anemometer. | | | | | | | |
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean Degree of Humidity. | Mean Weight of Cubic Foot of Air. | North. | East. | South. | West. | Number of Calm, or nearly calm, Days. | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of Days on which Rain fell. | Rain fall on the Ground. | Latitude. | Longitude. |
| | | | | | | | | | | | lbs. per sq. foot | Miles | | | | Inches | ° ′ | ° ′ |
| 75·5 | ·886 | 9·4 | 2·7 | 79·1 | 505·3 | * | * | * | * | * | * | * | * | * | * | * | 6 56 N. | 79 49 E. |
| 68·5 | ·699 | 7·6 | 4·1 | 64·6 | ... | 63·25 | 64·00 | 88·25 | 96·00 | 53·50 | ... | ... | 4·7 | 5·1 | 116 | 59·64 | 7 18 „ | 80 48 „ |
| 53·4 | ·414 | 4·6 | 2·3 | 69·8 | ... | 67·50 | 80·00 | 106·00 | 111·50 | 0·00 | ... | ... | 4·5 | 6·4 | 206 | 73·66 | 6 48 „ | 80 48 „ |
| 73·5 | ·832 | 8·6 | 4·6 | 64·1 | ... | 87·50 | 130·75 | 98·25 | 48·50 | 0·00 | ... | ... | 5·2 | 4·8 | 110 | 57·98 | 8 30 „ | 82 0 „ |

* Too incomplete to summarize.

## Abstract of Results of Meteorological Observations

### GIBRALTAR. Lat. 36° 6′ N.

| Month. | Readings of the Barometer. | | | Temperature of the Air. | | | | | | | Mean Daily Readings of | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Mean | | | | | | Hygrometer. | |
| | Mean reduced and corrected to 32°. | Highest reduced and corrected to 32°. | Lowest reduced and corrected to 32°. | Highest during Month. | Lowest during Month. | Range during Month. | Of all the highest. | Of all the lowest. | Daily Range. | Approximate Temperature. | Maximum in Sun's rays. | Minimum on Grass. | Dry Bulb. | Wet Bulb. |
| January ... ... | 30·082 | 30·449 | 29·760 | 66·0 | 38·0 | 28·0 | 58·1 | 46·5 | 11·6 | 52·3 | 73·8 | 37·5 | 54·0 | 50·3 |
| February ... ... | 29·909 | 30·299 | 29·205 | 69·0 | 43·0 | 26·0 | 61·9 | 50·3 | 11·6 | 56·1 | 82·0 | 40·3 | 57·0 | 54·1 |
| March ... ... | 29·914 | 30·136 | 29·573 | 71·0 | 42·0 | 29·0 | 64·0 | 50·2 | 13·8 | 57·1 | 88·4 | 42·7 | 60·0 | 55·8 |
| April ... ... | 30·037 | 30·280 | 29·731 | 78·0 | 47·0 | 31·0 | 66·3 | 51·8 | 14·5 | 59·0 | 91·5 | 45·6 | 62·2 | 58·7 |
| May ... ... | 30·020 | 30·149 | 29·873 | 82·0 | 49·0 | 33·0 | 74·0 | 57·1 | 16·9 | 65·5 | 109·7 | 51·2 | 68·9 | 62·9 |
| June ... ... | 30·024 | 30·200 | 29·843 | 90·5 | 55·0 | 35·5 | 83·6 | 63·2 | 20·4 | 73·4 | 129·5 | 56·7 | 75·2 | 68·7 |
| July ... ... | 29·964 | 30·186 | 29·783 | 92·0 | 61·0 | 31·0 | 86·0 | 65·0 | 21·0 | 75·5 | 127·9 | 58·9 | 77·8 | 70·5 |
| August ... ... | 29·919 | 30·046 | 29·736 | 92·9 | 60·0 | 32·0 | 84·6 | 63·8 | 20·8 | 74·2 | 125·3 | 56·1 | 76·8 | 71·1 |
| September ... | 30·042 | 30·192 | 29·901 | 90·5 | 59·0 | 31·5 | 80·9 | 63·8 | 17·1 | 72·3 | 112·2 | 57·2 | 75·7 | 71·1 |
| October... ... | 30·093 | 30·276 | 29·951 | 82·0 | 50 0 | 32·0 | 75·4 | 57·8 | 17·6 | 66·6 | 104·1 | 51·4 | 70·5 | 66·4 |
| November ... | 29·983 | 30·455 | 29·623 | 78·0 | 41·0 | 37·0 | 65·5 | 48·9 | 16·6 | 57·2 | 91·1 | 40·8 | 60·8 | 56·9 |
| December ... | 29·925 | 30·175 | 29·465 | 72·0 | 30·0 | 42·0 | 60·4 | 45·9 | 14·5 | 53·1 | 78·7 | 37·5 | 55·8 | 52·3 |
| Yearly Sums, Means, and Totals ... | 29·993 | 30·237 | 29·[illegible] | 92·2 | 48·9 | 32·3 | 71·7 | 55·4 | 16·3 | 63·5 | 101·2 | 48·8 | 66·2 | 61·2 |

### MALTA. Lat. 30° 53′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | 29·937 | 30·258 | 29·584 | 64·2 | 42·8 | 21·4 | 59·2 | 51·0 | 8·2 | 55·1 | 116·4 | 38·7 | 56·3 | 51·1 |
| February ... ... | 29·754 | 30·122 | 29·409 | 69·0 | 46·6 | 22·4 | 61·2 | 52·8 | 8·4 | 57·0 | 116·3 | 40·6 | 58·7 | 53·8 |
| March ... ... | 29·640 | 30·000 | 29·196 | 67·6 | 46·0 | 21·6 | 61·4 | 52·9 | 8·5 | 57·0 | 117·5 | 41·6 | 58·9 | 53·9 |
| April ... ... | 29·844 | 30·162 | 29·465 | 75·6 | 49·0 | 26·6 | 63·9 | 54·2 | 9·7 | 59·0 | 123·7 | 43·8 | 61·6 | 55·0 |
| May ... ... | 29·842 | 30·061 | 29·516 | 83·2 | 57·0 | 26·2 | 73·6 | 63·4 | 10·2 | 68·5 | 130·1 | 53·7 | 70·2 | 64·5 |
| June ... ... | 29·860 | 30·015 | 29·723 | 91·6 | 67·8 | 23·8 | 80·8 | 70·4 | 10·4 | 75·6 | 136·1 | 61·8 | 77·7 | 70·7 |
| July ... ... | 29·757 | 29·899 | 29·637 | 98·4 | 73·0 | 25·4 | 86·4 | 75·3 | 11·1 | 80·8 | 140·6 | 63·4 | 82·8 | 74·3 |
| August ... ... | 29·731 | 29·896 | 29·545 | 92·0 | 69·0 | 23·0 | 85·7 | 75·0 | 10·7 | 80·3 | 138·9 | 61·9 | 81·[illegible] | 74·4 |
| September ... | 29·886 | 30·067 | 29·713 | 91·0 | 57·0 | 34·0 | 79·6 | 69·8 | 9·8 | 74·7 | 135·6 | 55·8 | [illegible]·2 | 68·9 |
| October... ... | 29·884 | 30·132 | 29·654 | 83·2 | 61·0 | 22·2 | 74·1 | 65·7 | 8·4 | 69·9 | 130·4 | 50·2 | 72·1 | 64·9 |
| November ... | 29·848 | 30·090 | 29·456 | 77·6 | 55·8 | 21·8 | 71·0 | 62·5 | 8·5 | 66·7 | 124·3 | 46·1 | 68·6 | 62·3 |
| December ... | 29·708 | 30·002 | 29·282 | 71·6 | 49·0 | 22·6 | 64·4 | 55·7 | 8·7 | 60·0 | 114·1 | 38·6 | 61·1 | 55·7 |
| Yearly Sums, Means, and Totals ... | 29·808 | 30·058 | 29·515 | 80·4 | 56·2 | 23·4 | 71·8 | 62·4 | 9·4 | 67·1 | 127·0 | 47·2 | 69·0 | 62·4 |

### SCUTARI. Lat. 41° 0′ N.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... | 29·973 | 30·241 | 29·422 | 63·6 | 13·2 | 50·4 | 52·3 | 39·2 | 13·1 | 45·7 | 77·1 | 31·3 | 46·7 | 44·1 |
| February ... ... | 30·042 | 30·482 | 29·216 | 65·0 | 17·4 | 47·6 | 46·9 | 33·3 | 13·6 | 40·1 | 81·3 | 26·4 | 40·9 | 38·0 |
| March ... ... | 29·773 | 30·167 | 29·389 | 62·6 | 28·6 | 34·0 | 52·2 | 39·5 | 12·7 | 45·8 | 88·6 | 32·8 | 47·2 | 44·3 |
| April ... ... | 29·928 | 30·207 | 29·510 | 72·8 | 29·8 | 43·0 | 55·7 | 40·0 | 15·7 | 47·8 | 101·6 | 32·2 | 50·6 | 46·5 |
| May ... ... | 29·952 | 30·180 | 29·754 | 84·6 | 47·8 | 36·8 | 75·4 | 53·5 | 21·9 | 64·4 | 124·3 | 45·6 | 68·5 | 61·5 |
| June ... ... | 29·896 | 30·108 | 29·705 | 85·2 | 51·0 | 34·2 | 80·5 | 58·1 | 22·4 | 69·3 | 127·4 | 50·4 | 73·4 | 65·9 |
| July ... ... | 29·802 | 30·119 | 29·602 | 93·0 | 57·0 | 36·0 | 86·9 | 62·6 | 24·3 | 74·7 | 133·1 | 55·2 | 79·5 | 69·7 |
| August ... ... | 29·723 | 30·015 | 29·455 | 96·0 | 55·4 | 40·6 | 87·8 | 63·2 | 24·6 | 75·5 | 133·1 | 55·9 | 80·1 | 69·4 |
| September ... | 29·915 | 30·087 | 29·638 | 87·8 | 47·2 | 40·6 | 74·5 | 55·4 | 19·1 | 64·9 | 116·4 | 49·1 | 68·2 | 61·4 |
| October... ... | 29·908 | 30·277 | 29·548 | 74·2 | 42·4 | 31·8 | 65·1 | 50·5 | 14·6 | 57·8 | 100·6 | 43·8 | 60·1 | 55·9 |
| November ... | 30·045 | 30·291 | 29·768 | 75·4 | 42·6 | 32·8 | 64·5 | 50·8 | 13·7 | 57·6 | 94·7 | 43·2 | 59·7 | 55·8 |
| December ... | 29·833 | 30·126 | 29·415 | 64·6 | 34·2 | 30·4 | 57·1 | 44·0 | 13·1 | 50·5 | 80·2 | 36·0 | 52·3 | 48·6 |
| Yearly Sums, Means, and Totals ... | 29·816 | 30·192 | 29·535 | 77·1 | 38·9 | 38·2 | 66·6 | 49·2 | 17·4 | 57·9 | 104·9 | 41·8 | 58·9 | 55·1 |

No. XXIII—*continued.*

taken at Stations in the Mediterranean, in the Year 1870.

Long. 5° 20′ W. Height above Sea 50 feet.

| Hygrometrical Results from Glaisher's Tables (3rd edition). | | | | | | Atmospherical Conditions. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | In a Cubic Foot of Air. | | | | Number of Days for mean Direction of Wind. | | | | | Calculated from Robinson's Anemometer. | | | | | Amount of Rain fall. | |
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean Degree of Humidity. | Mean Weight of Cubic Foot of Air. | North. | East. | South. | West. | Number of calm, or nearly calm, Days. | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of Days on which Rain fell. | On the Ground. | Feet above the Ground. |
| | | | | | | | | | | | lbs. per sq. foot | Miles | | | | Inches | Inches |
| 46·7 | ·317 | 3·6 | 1·1 | 75·8 | 541·9 | 10·25 | 10·00 | 2·00 | 8·75 | 0·00 | ... | 534·0 | 4·7 | 3·6 | 10 | 3·35 | 2·97 |
| 51·4 | ·380 | 4·2 | 1·0 | 81·6 | 535·1 | 9·25 | 4·25 | 1·75 | 12·75 | 0·00 | ... | 669·8 | 5·1 | 3·6 | 19 | 6·41 | 5·67 |
| 52·1 | ·390 | 4·3 | 1·5 | 75·0 | 532·0 | 3·50 | 13·25 | 4·25 | 10·00 | 0·00 | ... | 650·0 | 2·8 | 3·3 | 9 | 3·33 | 2·93 |
| 55·7 | ·445 | 4·9 | 1·3 | 79·5 | 531·5 | 2·50 | 21·25 | 2·75 | 3·50 | 0·00 | ... | 639·5 | 4·5 | 3·3 | 8 | 3·24 | 3·04 |
| 58·2 | ·486 | 5·4 | 2·4 | 68·0 | 524·5 | 3·50 | 19·50 | 1·50 | 6·50 | 0·00 | ... | 562·5 | 2·6 | 3·0 | 2 | 0·60 | 0·50 |
| 64·0 | ·598 | 6·6 | 3·0 | 68·0 | 517·6 | 1·75 | 20·00 | 1·25 | 7·00 | 0·00 | ... | 654·8 | 1·2 | 2·6 | ... | ... | ... |
| 65·4 | ·628 | 6·7 | 3·5 | 65·8 | 513·9 | 3·50 | 14·75 | 2·75 | 10·00 | 0·00 | ... | ... | 5·9 | 1·9 | ... | ... | ... |
| 67·1 | ·665 | 7·2 | 2·8 | 72·2 | 513·9 | 1·25 | 15·00 | 6·25 | 8·50 | 0·00 | ... | ... | 1·6 | 2·0 | 3 | 0·48 | 0·38 |
| 67·8 | ·681 | 7·3 | 2·3 | 76·7 | 516·9 | 4·50 | 17·00 | 4·25 | 4·25 | 0·00 | ... | ... | 2·9 | 2·3 | 4 | 0·90 | 0·83 |
| 63·3 | ·583 | 6·4 | 1·8 | 77·5 | 526·5 | 3·50 | 15·50 | 3·75 | 8·25 | 0·00 | ... | ... | 3·2 | 2·5 | 2 | 0·30 | 0·29 |
| 53·6 | ·411 | 4·6 | 1·3 | 77·9 | 532·5 | 4·00 | 10·25 | 4·00 | 11·75 | 0·00 | ... | ... | 3·8 | 2·8 | 9 | 5·21 | 4·86 |
| 49·0 | ·350 | 3·9 | 1·1 | 78·8 | 537·0 | 6·75 | 5·50 | 4·50 | 14·25 | 0·00 | ... | ... | 4·0 | 2·9 | 15 | 7·90 | 7·23 |
| 57·8 | ·494 | 5·4 | 1·9 | 74·7 | 527·0 | 54·25 | 166·25 | 39·00 | 105·50 | 0·00 | ... | ... | 3·5 | 2·8 | 81 | 31·72 | 28·70 |

Long. 14° 30′ E. Height above Sea 111 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46·2 | ·315 | 3·5 | 1·5 | 69·5 | 536·8 | 11·00 | 5·00 | 4·00 | 11·00 | 0·00 | ... | 130·8 | 4·5 | 4·8 | 10 | 2·02 | 2·00 |
| 49·5 | ·354 | 4·0 | 1·6 | 71·5 | 530·8 | 6·50 | 8·50 | 5·50 | 7·50 | 0·00 | ... | 169·9 | 4·8 | 6·5 | 10 | 2·22 | 2·18 |
| 49·1 | ·349 | 3·9 | 1·7 | 70·0 | 528·7 | 8·50 | 4·75 | 4·75 | 13·00 | 0·00 | ... | 154·7 | 6·0 | 6·8 | 10 | 2·54 | 2·57 |
| 49·3 | ·351 | 3·9 | 2·2 | 64·6 | 529·5 | 11·75 | 7·25 | 2·50 | 8·50 | 0·00 | ... | 137·7 | 3·9 | 6·7 | 7 | 2·28 | 2·28 |
| 60·1 | ·522 | 5·7 | 2·4 | 70·2 | 519·9 | 12·75 | 10·00 | 1·25 | 4·00 | 3·00 | ... | 92·8 | 3·5 | 6·9 | 1 | 0·06 | 0·06 |
| 65·8 | ·637 | 6·8 | 3·4 | 67·0 | 512·2 | 15·00 | 8·75 | 1·25 | 5·00 | 0·00 | ... | 80·3 | 2·7 | 6·0 | 3 | 0·05 | 0·05 |
| 68·6 | ·700 | 7·5 | 4·5 | 62·8 | 505·3 | 13·75 | 4·75 | 1·00 | 9·50 | 2·00 | ... | 88·1 | 1·8 | 4·9 | 1 | ... | ... |
| 68·3 | ·705 | 7·5 | 4·4 | 63·5 | 504·9 | 9·25 | 3·75 | 3·75 | 9·75 | 4·50 | ... | 75·2 | 1·9 | 5·7 | 3 | 0·07 | 0·07 |
| 63·1 | ·578 | 6·2 | 3·8 | 62·0 | 513·5 | 13·25 | 8·75 | 1·50 | 6·50 | 0·00 | ... | 107·1 | 3·9 | 5·3 | 8 | 2·98 | 2·96 |
| 59·5 | ·510 | 5·5 | 3·0 | 64·2 | 518·8 | 11·50 | 5·75 | 3·25 | 10·50 | 0·00 | ... | 156·8 | 4·5 | 5·5 | 6 | 2·06 | 2·00 |
| 37·4 | ·471 | 5·2 | 2·4 | 66·5 | 521·8 | 7·50 | 7·25 | 7·25 | 8·00 | 0·00 | ... | 152·8 | 5·2 | 6·1 | 5 | 0·40 | 0·38 |
| 51·0 | ·374 | 4·2 | 1·8 | 70·1 | 527·5 | 6·25 | 5·00 | 5·25 | 13·00 | 1·50 | ... | 124·6 | 5·1 | 5·7 | 13 | 2·60 | 2·60 |
| 57·4 | ·489 | 5·3 | 2·7 | 62·2 | 521·6 | 127·00 | 79·50 | 41·25 | 106·25 | 11·00 | ... | 122·7 | 3·8 | 5·8 | 77 | 17·28 | 17·13 |

Long. 29° 3′ E. Height above Sea 60 feet.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41·1 | ·259 | 3·0 | 0·7 | 81·8 | 548·1 | 11·75 | 5·50 | 6·25 | 5·00 | 1·00 | ... | 203·9 | 7·0 | 6·5 | 14 | 2·58 | 1·50 |
| 34·3 | ·198 | 2·3 | 0·7 | 77·7 | 556·0 | 8·50 | 7·00 | 6·50 | 4·00 | 1·00 | ... | 216·1 | 7·0 | 6·6 | 17 | 2·73 | 2·14 |
| 41·1 | ·258 | 3·0 | 0·7 | 79·9 | 543·9 | 10·00 | 8·00 | 3·75 | 5·75 | 2·00 | ... | 227·5 | 7·6 | 5·7 | 19 | 3·78 | 3·12 |
| 42·2 | ·269 | 3·1 | 1·1 | 74·0 | 542·9 | 11·75 | 5·50 | 4·75 | 5·00 | 1·00 | ... | 214·3 | 6·1 | 5·1 | 14 | 3·42 | 3·11 |
| 56·0 | ·449 | 4·9 | 2·7 | 64·0 | 524·0 | 11·25 | 4·75 | 7·50 | 4 00 | 1·50 | ... | 155·7 | 4·6 | 5·1 | 3 | 0·34 | 0·28 |
| 60·3 | ·526 | 5·7 | 3·2 | 64·4 | 517·7 | 9·00 | 6·00 | 7·50 | 6·00 | 0·00 | ... | 143·9 | 3·0 | 4·6 | 5 | 1·59 | 1·51 |
| 63·0 | ·575 | 6·2 | 4·6 | 56·6 | 509·8 | 12·50 | 10·00 | 4·25 | 3·75 | 0·00 | ... | 176·8 | 2·3 | 2·9 | 2 | 1·37 | 1·27 |
| 62·1 | ·557 | 5·9 | 5·1 | 53·9 | 508·1 | 9·75 | 5·75 | 9·75 | 5·25 | 0·00 | ... | 131·3 | 3·1 | 5·0 | 6 | 1·07 | 0·94 |
| 56·1 | ·450 | 4·9 | 2·6 | 64·8 | 523·6 | 13·50 | 9·00 | 1·50 | 5·00 | 0·00 | ... | 174·2 | 5·6 | 5·7 | 16 | 2·58 | 2·35 |
| 52·2 | ·391 | 4·4 | 1·5 | 75·0 | 531·9 | 8·00 | 7·25 | 7·75 | 6·50 | 0·50 | ... | 235·1 | 6·2 | 6·4 | 15 | 6·79 | 6·14 |
| 52·4 | ·394 | 4·4 | 1·3 | 77·3 | 534·7 | 4·50 | 5·25 | 10·50 | 5·75 | 3·50 | ... | 148·1 | 6·4 | 6·2 | 5 | 0·13 | 0·11 |
| 44·8 | ·298 | 3·4 | 1·2 | 76·1 | 539·4 | 2·75 | 5·75 | 11·25 | 8·25 | 2·00 | ... | 252·7 | 6·8 | 6·4 | 15 | 3 66 | 3·17 |
| 50·4 | ·385 | 4·3 | 2·1 | 70·5 | 531·7 | 113·25 | 79·75 | 81·25 | 64·25 | 12·50 | ... | 189·9 | 5·5 | 5·5 | 131 | 30·04 | 25·64 |

351 days only.

Appendix

Abstract of Results of Meteorological Observations

| Stations, with their Height above the Sea. | Readings of the Barometer. | | | Temperature of the Air. | | | | | | | Mean Daily Readings of | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean reduced and corrected to 32°. | Highest reduced and corrected to 32°. | Lowest reduced and corrected to 32°. | Highest during Year. | Lowest during Year. | Range during Year. | Mean. | | | | Maximum in Sun's rays. | Minimum on Grass. | Hygrometer. | |
| | | | | | | | Of all the highest. | Of all the lowest. | Daily Range. | Approximate Temperature. | | | Dry Bulb. | Wet Bulb. |
| Gibraltar ... 50 feet | 29·993 | 30·455 | 29·205 | 92·0 | 30·0 | 62·0 | 71·7 | 55·4 | 16·3 | 63·5 | 101·2 | 48·8 | 66·2 | 61·2 |
| Malta ... 111 „ | 29·808 | 30·258 | 29·916 | 98·4 | 42·8 | 55·6 | 71·8 | 62·4 | 9·4 | 67·1 | 127·0 | 47·2 | 69·0 | 62·4 |
| Scutari ... 50 „ | 29·816 | 30·482 | 29·216 | 96·0 | 13·2 | 82·8 | 66·6 | 49·2 | 17·4 | 57·9 | 104·9 | 41·8 | 58·9 | 55·1 |

No. XXIII—*continued.*

taken at Stations in the Mediterranean, in the Year 1870.

| Hygrometrical Results from Glaisher's Tables (3rd edition). | | | | | | Atmospherical Conditions. | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Temperature of Dew Point. | Mean elastic Force of Vapour. | In a Cubic Foot of Air. | | | Mean Weight of Cubic Foot of Air. | Number of Days for mean Direction of Wind. | | | | Number of calm, or nearly calm, Days. | Calculated from Robinson's Anemometer. | | Amount of Cloud 0—10. | Ozone Scale 0—10. | Number of Days on which Rain fell. | Rain fall on the Ground. | Latitude. | Longitude. |
| | | Mean Weight of Vapour. | Mean additional Weight required for Saturation. | Mean Degree of Humidity. | | North. | East. | South. | West. | | Mean daily pressure of Wind. | Mean daily Horizontal Movement of the Air. | | | | | | |
| | | | | | | | | | | | lbs. per sq. foot | Miles | | | | Inches | ° ′ | ° ′ |
| 57·8 | ·494 | 5·4 | 1·9 | 74·7 | 527·0 | 54·25 | 166·25 | 39·00 | 105·50 | 0·00 | ... | ... | 3·5 | 2·8 | 81 | 31·92 | 36 6 N. | 5 20 W. |
| 57·4 | ·489 | 5·3 | 2·7 | 62·2 | 521·6 | 127·00 | 79·50 | 41·25 | 106·25 | 11·00 | ... | 122·7 | 3·8 | 5·8 | 77 | 17·28 | 30 53 „ | 14 30 E. |
| 50·4 | ·385 | 4·3 | 2·1 | 70·5 | 531·7 | 113·25 | *79·75 | *81·25 | *64·25 | *12·50 | ... | 189·9 | 5·5 | 5·5 | 131 | 30·04 | 41 0 „ | 29 3 „ |

* For 351 days only.

# APPENDIX No. XXIV.

## SUPPLEMENT TO APPENDIX FOR 1869.

ABSTRACT showing the Ages of the Troops serving in the Bengal Command, and the Deaths at each Age, during the Year 1869.

| | Under 20. | | 20 and under 25. | | 25 and under 30. | | 30 and under 35. | | 35 and under 40. | | 40 and upwards. | | Total. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. |
| 4th Hussars .. .. .. | 21 | .. | 176 | 7 | 155 | 4 | 94 | 2 | 19 | .. | 2 | .. | 467 | 13 |
| 5th Lancers .. .. .. | 9 | .. | 43 | 1 | 221 | 3 | 202 | 6 | 6 | 1 | 1 | .. | 482 | 11 |
| 7th Hussars .. .. .. | 19 | 1 | 24 | 2 | 134 | 2 | 153 | 5 | 71 | .. | 5 | .. | 406 | 10 |
| 11th „ .. .. .. | 36 | .. | 112 | 1 | 185 | 1 | 113 | 2 | 20 | 1 | 8 | .. | 474 | 5 |
| 19th „ .. .. .. | 7 | .. | 65 | .. | 77 | 3 | 209 | 10 | 53 | 1 | 20 | .. | 431 | 14 |
| 20th „ .. .. .. | .. | .. | 28 | .. | 139 | 2 | 250 | 6 | 53 | 1 | 10 | 1 | 480 | 10 |
| 21st „ .. .. .. | 4 | .. | 8 | .. | 208 | .. | 86 | 6 | 14 | .. | 5 | .. | 325 | 6 |
| A Brigade Royal Horse Artillery . | 12 | .. | 180 | 4 | 244 | 9 | 186 | 10 | 74 | 5 | 6 | 1 | 702 | 29 |
| F Batt. C Brig. „ .. | .. | .. | 24 | 1 | 40 | .. | 62 | 1 | 14 | 1 | .. | .. | 140 | 3 |
| F Brigade „ .. | 4 | .. | 188 | 9 | 328 | 11 | 225 | 15 | 94 | 4 | 8 | .. | 847 | 39 |
| 8th „ Royal Artillery .. | 15 | 2 | 246 | 15 | 275 | 15 | 290 | 12 | 141 | 7 | 13 | 4 | 980 | 55 |
| 16th „ „ .. | 40 | .. | 278 | 16 | 364 | 19 | 231 | 13 | 79 | 4 | 20 | 2 | 1,012 | 54 |
| 19th „ „ .. | 48 | .. | 257 | 6 | 346 | 18 | 234 | 12 | 98 | 8 | 16 | 1 | 999 | 45 |
| 22nd „ „ .. | 5 | .. | 130 | 6 | 201 | 7 | 157 | 8 | 71 | 4 | 22 | 1 | 586 | 26 |
| 24th „ „ .. | 14 | 1 | 101 | 8 | 189 | 7 | 96 | 9 | 54 | 8 | 20 | 2 | 474 | 35 |
| 25th „ „ .. | 16 | .. | 98 | 6 | 141 | 5 | 91 | 2 | 28 | 1 | 8 | 2 | 382 | 16 |
| 1st Battalion 3rd Foot .. .. | 28 | .. | 294 | 2 | 320 | 1 | 187 | 3 | 63 | 1 | .. | .. | 892 | 7 |
| 1st „ 5th „ .. .. | 17 | 1 | 408 | 6 | 294 | 3 | 114 | 3 | 46 | .. | 5 | .. | 884 | 13 |
| 1st „ 6th „ .. .. | 121 | .. | 291 | 9 | 218 | 5 | 97 | 1 | 39 | 3 | 4 | .. | 770 | 18 |
| 1st „ 7th „ .. .. | 171 | 3 | 149 | 32 | 284 | 12 | 230 | 20 | 46 | 6 | 7 | .. | 887 | 73 |
| 1st „ 11th „ .. .. | 144 | .. | 305 | 8 | 184 | 10 | 93 | 6 | 70 | 5 | 6 | 3 | 802 | 32 |
| 2nd „ 12th „ .. .. | 30 | .. | 282 | 17 | 289 | 17 | 117 | 13 | 40 | 6 | 2 | 1 | 760 | 54 |
| 1st „ 14th „ .. .. | 114 | .. | 253 | 9 | 155 | 1 | 165 | 12 | 71 | 2 | 6 | .. | 764 | 24 |
| 1st „ 19th „ .. .. | 31 | 1 | 220 | 2 | 301 | 1 | 205 | 1 | 47 | 2 | .. | .. | 804 | 7 |
| 2nd „ 25th „ .. .. | 16 | .. | 259 | 1 | 420 | 7 | 89 | 3 | 40 | 3 | 2 | .. | 826 | 14 |

Supplement to Appendix for 1869—*continued.*

| | Under 20. | | 20 and under 25. | | 25 and under 30. | | 30 and under 35. | | 35 and under 40. | | 40 and upwards. | | Total. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. | Strength, 1st Jan. | Died. |
| 26th Foot .. .. .. .. | 30 | .. | 351 | 2 | 292 | 8 | 169 | 8 | 64 | 1 | 11 | 3 | 917 | 22 |
| 36th „ .. .. .. .. | 25 | 6 | 148 | 31 | 237 | 48 | 253 | 38 | 47 | 3 | 15 | 1 | 725 | 127 |
| 37th „ .. .. .. .. | 84 | .. | 264 | 11 | 270 | 7 | 107 | 2 | 73 | 7 | 10 | 1 | 808 | 28 |
| 38th „ .. .. .. .. | 74 | .. | 193 | 3 | 305 | 3 | 262 | 3 | 89 | 1 | 5 | .. | 928 | 10 |
| 41st „ .. .. .. .. | 43 | 2 | 333 | 18 | 221 | 7 | 185 | 11 | 49 | 1 | 17 | 1 | 848 | 40 |
| 55th „ .. .. .. .. | 18 | 1 | 187 | 1 | 399 | 1 | 232 | 5 | 70 | 9 | 12 | 1 | 918 | 18 |
| 58th „ .. .. .. .. | 152 | 6 | 192 | 28 | 205 | 53 | 90 | 26 | 30 | 12 | .. | 2 | 669 | 127 |
| 2nd Battalion 60th Foot .. .. | 45 | .. | 335 | 7 | 236 | 9 | 134 | 7 | 47 | 1 | 8 | 2 | 805 | 26 |
| 62nd Foot .. .. .. .. | 232 | 8 | 287 | 36 | 166 | 21 | 136 | 16 | 25 | 5 | .. | 2 | 846 | 88 |
| 77th „ .. .. .. .. | 32 | 2 | 149 | 3 | 365 | 3 | 183 | 1 | 32 | 1 | 2 | 1 | 763 | 11 |
| 79th „ .. .. .. .. | 31 | .. | 135 | 2 | 454 | 6 | 93 | 7 | 20 | 5 | 6 | 1 | 739 | 21 |
| 85th „ .. .. .. .. | 176 | .. | 300 | 7 | 134 | 4 | 133 | 2 | 33 | 2 | .. | .. | 776 | 15 |
| 88th „ .. .. .. .. | 18 | 1 | 103 | 4 | 402 | 7 | 154 | 16 | 47 | 3 | 2 | 2 | 726 | 33 |
| 92nd „ .. .. .. .. | 93 | 1 | 356 | 11 | 206 | 19 | 119 | 9 | 38 | 1 | 4 | 1 | 816 | 42 |
| 93rd „ .. .. .. .. | 46 | .. | 263 | 6 | 229 | 3 | 137 | 6 | 25 | 7 | .. | .. | 700 | 22 |
| 96th „ .. .. .. .. | .. | .. | 519 | 10 | 189 | 8 | 141 | 6 | 19 | 6 | .. | .. | 868 | 30 |
| 102nd „ .. .. .. .. | 9 | 1 | 246 | 4 | 263 | 11 | 219 | 9 | 76 | 6 | 40 | .. | 853 | 31 |
| 103rd „ .. .. .. .. | 84 | 1 | 236 | 12 | 196 | 21 | 172 | 16 | 62 | 7 | 6 | 1 | 756 | 58 |
| 104th „ .. .. .. .. | 30 | .. | 95 | 15 | 219 | 24 | 248 | 39 | 125 | 11 | 9 | 3 | 726 | 92 |
| 105th „ .. .. .. .. | 21 | .. | 262 | 10 | 130 | 10 | 345 | 10 | 57 | 3 | 21 | 2 | 836 | 35 |
| 106th „ .. .. .. .. | 19 | .. | 222 | 1 | 278 | 4 | 156 | 4 | 80 | 4 | 19 | .. | 774 | 13 |
| 107th „ .. .. .. .. | 74 | .. | 265 | 2 | 319 | 4 | 124 | 5 | 51 | 5 | 3 | 2 | 836 | 18 |
| 109th „ .. .. .. .. | 36 | 3 | 325 | 3 | 233 | 4 | 145 | 3 | 47 | 5 | 24 | 4 | 810 | 22 |
| 3rd Battalion Rifle Brigade .. | 5 | .. | 157 | .. | 466 | 5 | 234 | 15 | 36 | 3 | .. | .. | 898 | 23 |
| | 2,299 | 41 | 10,342 | 395 | 12,126 | 453 | 8,147 | 445 | 2,593 | 183 | 410 | 48 | 35,917 | 1,565 |

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